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13. ABSTRACT *(Maximum 200 words)*

The Ground-Truth Database (GTDB) is a collection of regional waveforms and phase parameters generated by seismic events of known type, (i.e. earthquake, quarry blast, etc.) where the event type is confirmed by some means in addition to seismic observations. The ground-truth data, in order of importance are: event type, location, depth and origin time. References to the source of the ground-truth (usually a document or a person) are readily available in the GTDB. The most significant modification to CSS 3.0 tables is that the **origin** table is used to store event information collected from experts in the local areas. This has resulted in a "hybrid" **origin** table that contains, in each field, the best information available at the time of this writing. Version 1 of the GTDB includes 82 events in three distinct regions. Dataset #1 consists of 11 earthquakes and 15 quarry blasts in the Vogtland region of northwest Bohemia, Czech Republic; Dataset #2 consists of 25 events from an earthquake swarm just off the west coast of northern Norway in the Steigen area; Dataset #3 consists of 31 induced mine tremors in a major mining district known as the Lubin Copper Basin in western Poland. The GTDB is part of the Center's Central Database Repository (CDR), available on-line under the account "DISCRIM1".

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CSS Ground-Truth Database: Version 1 Handbook

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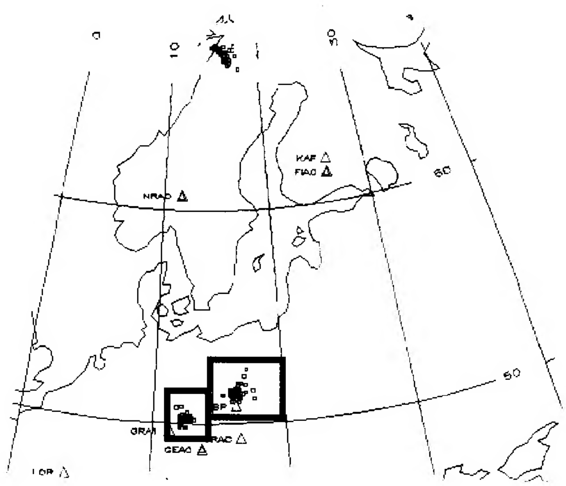

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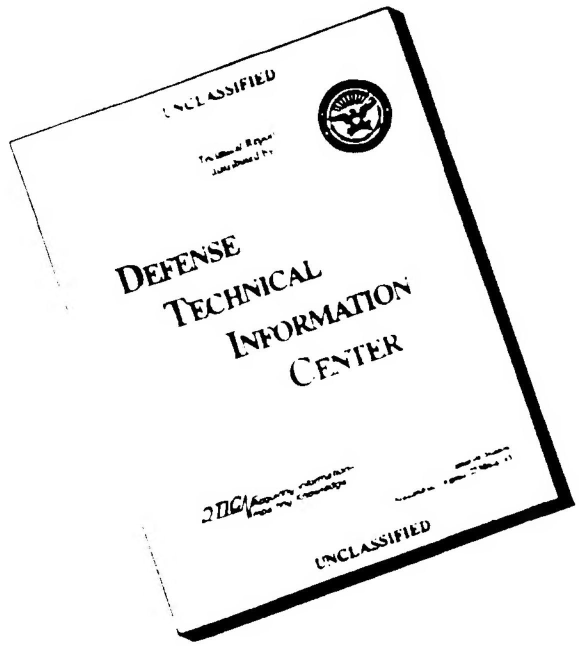

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CSS Ground-Truth Database: Version 1 Handbook

TABLE of CONTENTS

PART 1: DATABASE DESCRIPTION

PART 2: DATASETS

PART 3: EVENT PLOTS

Preface

This database was made possible by enthusiastic support from many local experts who contributed information early and often. Especially helpful where Jan Wüster, Germany; Petr Firbas, Czech Republic; Pawel Wiejacz, Poland; and Atakan Kuvvet, Norway. Support from the international community is essential and greatly appreciated. A complete list of persons making direct and indirect contributions of information contained in this database is included in Part 1, Chapter 3 of this handbook.

PART 1: DATABASE DESCRIPTION
Chapter 1: Introduction

1.1 Objective and Motivation

The objective of the Ground-Truth Database (GTDB) is simple. It is to be a collection of regional waveforms and carefully-reviewed phase parameters generated by seismic events of known type, (i.e. earthquake, quarry blast, etc.) where the event type is confirmed by some means in addition to seismic observations.

The motivation for building the GTDB is to bridge the gap between seismic data and factual information about the events generating it. Researchers will have access to an encapsulated data product so the information-gathering procedure that starts off many studies is simplified and the research emphasized. The intention of this approach is to provide a database that researchers will have confidence in and use repeatedly.

The GTDB is an on-going project and is intended to become a repository for data from known events. It will be used in a variety of applications, with the primary purpose being seismic event discrimination research. Without knowing true location and source type of seismic events detected and located by automatic systems such as IMS (Bache *et al.*, 1990, Bratt *et al.*, 1990), it is difficult to evaluate the importance of event parameters leading to identification of event type. This is especially true in calibration of new areas where industrial blasts, mining-induced tremors and natural earthquakes are all possibilities. Because regional discriminants vary in their effectiveness with magnitude, source region, and depth, the database should be large enough to sample each of these well. Suggestions for the ideal research database are found in the Panel Report from the DARPA Event ID Workshop (DARPA, 1992).

1.2 Explanation Of The Term "Ground-truth"

The term "ground-truth", in reference to this database, means that at least some facts are known about each seismic event with a high level of confidence. The ground-truth data, in order of importance are: event type, location, depth and origin time. Other information such as charge size, for industrial blasts, or macroseismic information, for earthquakes, is also of importance. The more that is known about an event, the more confidence can be placed on the information associated with the event. References to the source of the ground-truth (usually a document or a person) are readily available in the GTDB.

Different methods of gathering ground-truth information result in different kinds of information and levels of confidence in the information. One approach is to start with unknown events of interest and gather associated ground-truth by contacting local experts. Another approach is to start with a list of known events, e. g. a list of felt earthquakes, and gather the waveforms. A third approach results in the highest level of confidence: when information is gathered by direct observation, as in an experiment.

1.3 Handbook Overview

This document is entitled "handbook" because its main purpose is to be a reference for users of the GTDB, describing what is known and what is unknown about the events, and how the information is organized in the database structure. Part 1 includes this brief introduction with the main emphasis on the framework of the GTDB. Part 2 explains the details of each dataset. Part 3 shows samples of data for each event.

1.4 Building the GTDB

This section describes the steps in building the GTDB. The remaining chapters in Part 1 provide more details for each step.

•Initial Event Lists

In building the GTDB, events were processed in groups, referred to as datasets, within a common geographical area. One of the first steps in adding a dataset to the GTDB was to isolate a list of events where there is a possibility of (a) satisfying some size and distance criteria (ml > 2.0 with recordings at two degrees or more), (b) obtaining waveforms, and (c) obtaining ground-truth.

•Waveform Data Sources

Once the initial list of events was identified, pertinent waveform data was collected for events in the list. At this stage in database development, waveform data that was most readily available was obtained. Thus Version 1 is limited to data from the Central Database Repository (CDR) at the Center for Seismic Studies (Center). Specifically, data collected by IMS and GSETT-2 operations are utilized. Future additions to the GTDB will not be limited to the Center's CDR, but rather will become a part of it.

The first two steps are closely related. In each case, we either start with a list of events recorded by a system and try to verify the circumstances generating them or, we start with a list of events of known type and try to collect waveform data for them. In either case, only events that have both ground-truth information and regional waveforms are valid in the GTDB.

•Verification of Ground-Truth

The process of verification of ground-truth involves communication with individuals who have some knowledge of the seismicity in the areas where the events occurred or where they were recorded. After such information is received, it is verified and additional requests are sent back to the local experts, if necessary to resolve conflicting information or to answer specific questions. Chapter 3.0 lists each person who contributed ground-truth information to the GTDB.

•Review, Revision of Parameter Data

Seismic waveform analysis was performed on each event in the GTDB for the purposes of verifying the arrival time picks and phase identification. The analysis was carried out in a consistent manner: with one analyst; analyzing groups of events by geographic area; and following a standard set of rules. Chapter 4.0 describes rules used in analysis.

• Quality Control- Selection of Waveform Data

After waveform analysis was complete, the waveform data quality was reviewed. In general, only waveforms with arrivals associated to one of the GTDB events were included in the GTDB. Waveforms with constant data value were excluded, as well as some waveforms with serious data problems. Chapter 5.0 addresses waveform data quality.

• Database Relations

While developing the discrimination database, extensions were added to the CSS Version 3.0 Database Schema (Anderson *et al.*, 1990) for handling detailed source information, and for storing and quickly retrieving bibliographic references, general comments, and ground-truth information. An attempt was made to draw from the experience of others in designing new schema, relying on standard CSS Version 3.0 schema where possible. The most significant modification to CSS 3.0 tables is that the **origin** table is used to store event information collected from experts in the local areas. This has resulted in a "hybrid" **origin** table that contains, in each field, the best information available at the time of this writing. GTDB Schema are described in detail in Chapter 6.0.

• Results

Version 1 of the GTDB includes 82 events in three distinct regions shown in Figure 1. Dataset #1 consists of 11 earthquakes and 15 quarry blasts in the Vogtland region of northwest Bohemia, Czech Republic; Dataset #2 consists of 25 events from an earthquake swarm just off the west coast of northern Norway in the Steigen area; Dataset #3 consists of 31 induced mine tremors in a major mining district known as the Lubin Copper Basin in western Poland.

The GTDB is part of the Center's Central Database Repository (CDR), available on-line under the account "DISCRIM1". Waveforms belonging to the GTDB are stored on the Center's mass storage device (Epoch). CenterView, an X-windows program designed specifically for viewing and retrieving seismic parametric and waveform data, accesses the DISCRIM1 account. Availability of these datasets are announced in the newsgroup *seismic.general* and are also e-mailed to the GTDB electronic-mailing list. Updates to tables in the current version of the GTDB are documented in the disk file *discrim1.log*, available in the directory ~grant/discrim1_updates on the machine, named *sol*, at the Center.

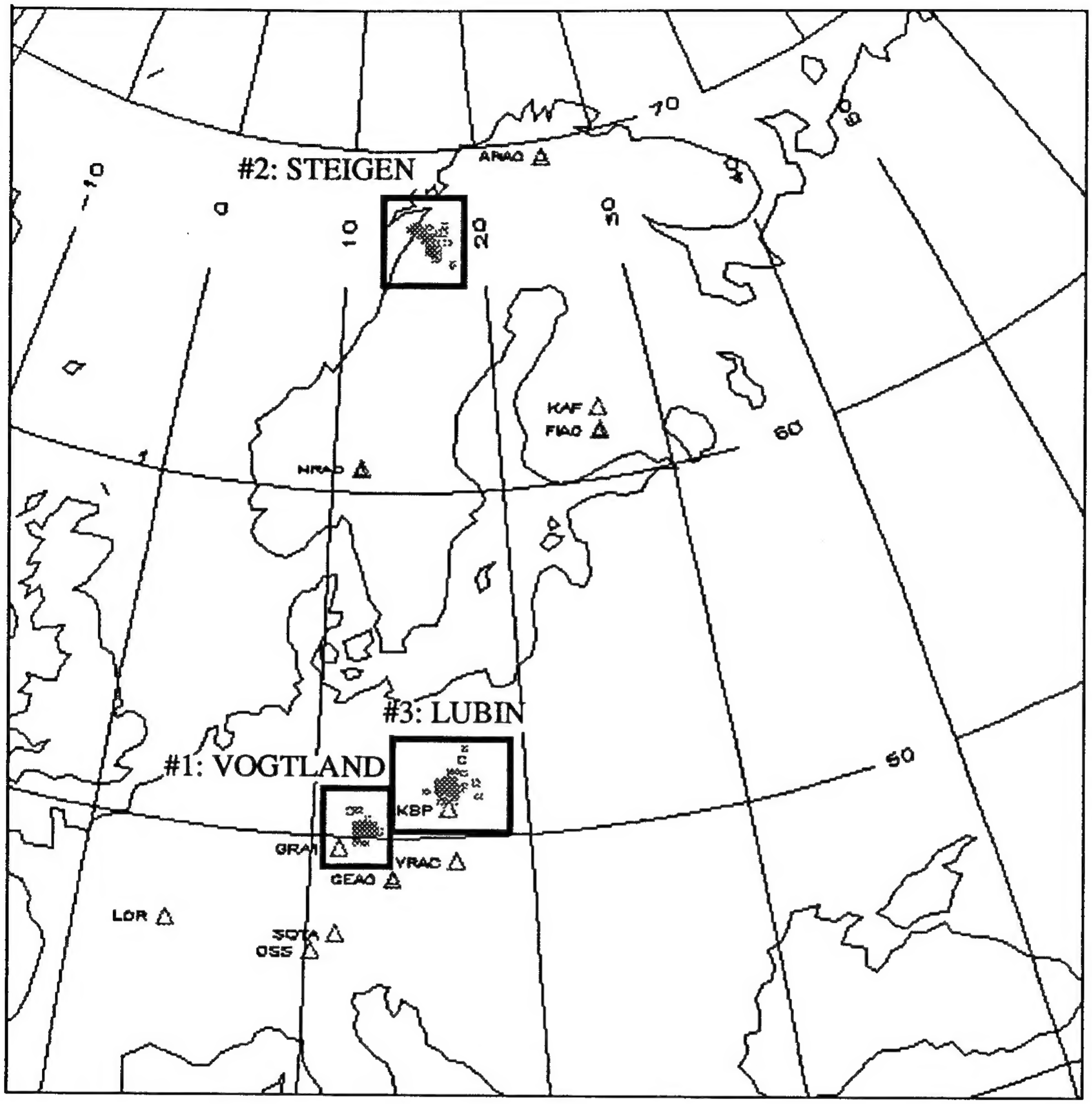

Figure 1: Three datasets comprising Version 1 of the Ground-Truth Database. Dataset #1: Vogtland is 11 earthquakes and 15 quarry blasts. Dataset #2: Steigen is 25 earthquakes and Dataset #3: Lubin is 31 induced mine tremors.

Chapter 2: Description Of Version 1

2.1 Sources of Seismic Waveform Data

2.1.1 Regional Seismicity as Recorded by IMS

The IMS detects and locates up to 10,000 events per year. Waveform and parameter data are stored in the Center's CDR. The large majority of these are events within regional distances of the ARCESS, FINESA, NORESS, and GERESS arrays and are spatially clustered in small areas representing mining-related activity. During the initial testing of the IMS (1 October through 25 November, 1989), 63% of the events were located within 50 km of known mines (Bratt, *et al.*, 1990). Figure 2 plots all events located by the IMS between January 1991 and January 1992 with IMS local magnitude > 2.0. The following sections summarize the dominant clusters and their relation to the datasets in the GTDB.

Events within 500 km of GERESS are shown in Figure 3. Six dominant clusters are identified by letters a-f, and are described below:

(a) Open-pit stone quarries and open-pit coal mines in NW Bohemia (two open-pit mines and one quarry are represented in Dataset #1) (Firbas, pers. comm.) The western edge of this cluster includes some natural earthquakes, also represented in Dataset #1;

(b) Ppen-pit brown coal mines in North Bohemia. (Firbas, pers. comm);

(c) Open-pit coal mine in Germany. (Harjes *et al.*, 1992);

(d) Underground copper mines in the Lubin Copper Basin of Poland (represented in Dataset #3). There are an estimated 120 mine-induced tremors > ml 2.0 in first six months of 1991 (Gibowicz, pers. comm.). Four underground mines are located within an area approximately 15 km by 4 km;

(e) Underground coal mines in the Upper Silesia Coal Basin of Poland. Hundreds of mining-induced tremors with local magnitude > 2.0 occur in this area each year. 63 underground mines are operational along a 40 km length of a fault This coal-producing area extends into Northern Moravia, Czech Republic;

(f) The "Iron Mountain" surface iron-ore mine near the town of Eisenerz, Austria has been operating since the 12th century and reliably shoots once per day. (Harjes *et al.*, 1992).

Events within 500 km of ARCESS are shown in Figure 3. Three major mining areas dominate the seismicity:

(g) Kirunavarra and Malmberget mines in northern Sweden;

(h) Apatity on the Kola Peninsula, Russia;

(i) the northwestern Kola Peninsula, Russia.

The events in Dataset #2 are located just off the coast of northern Norway in the Steigen area shown as location j in Figure 3. The nearest of the large mining-related clusters to the Steigen earthquakes is the Kirunavaara mine, approximately two degrees (~230 km) east of the Steigen events.

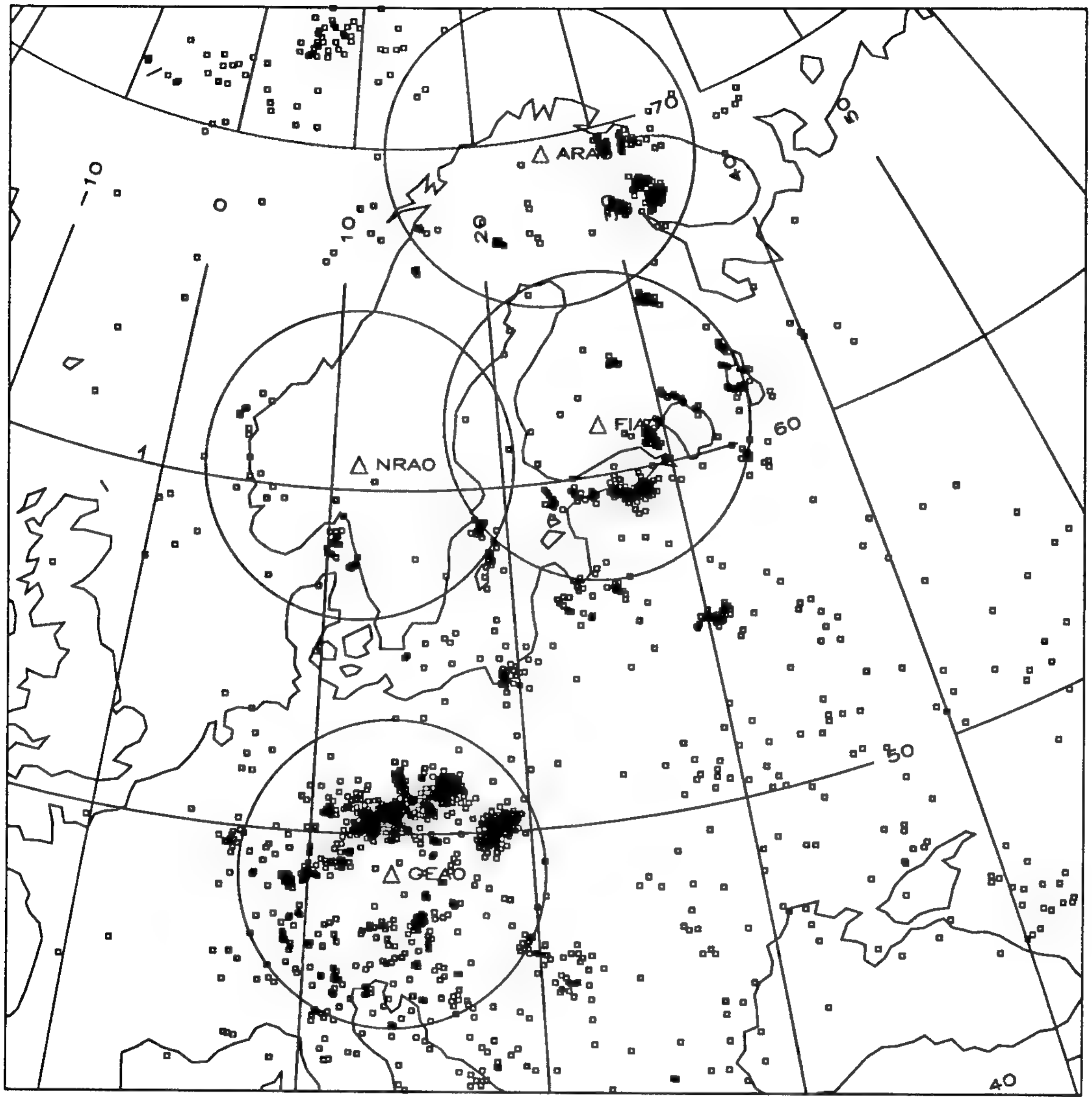

Figure 2: Seismicity near the four IMS2 regional arrays, ARCESS, FINESA, NORESS and GERESS. The map shows all events (2889) located by IMS2 between 30 January 1991 and 30 January 1992 with ml > 2.0. Rings centered on the arrays are 500 km radius. Figure 3 shows a close-up of the seismicity around GERESS and ARCESS.

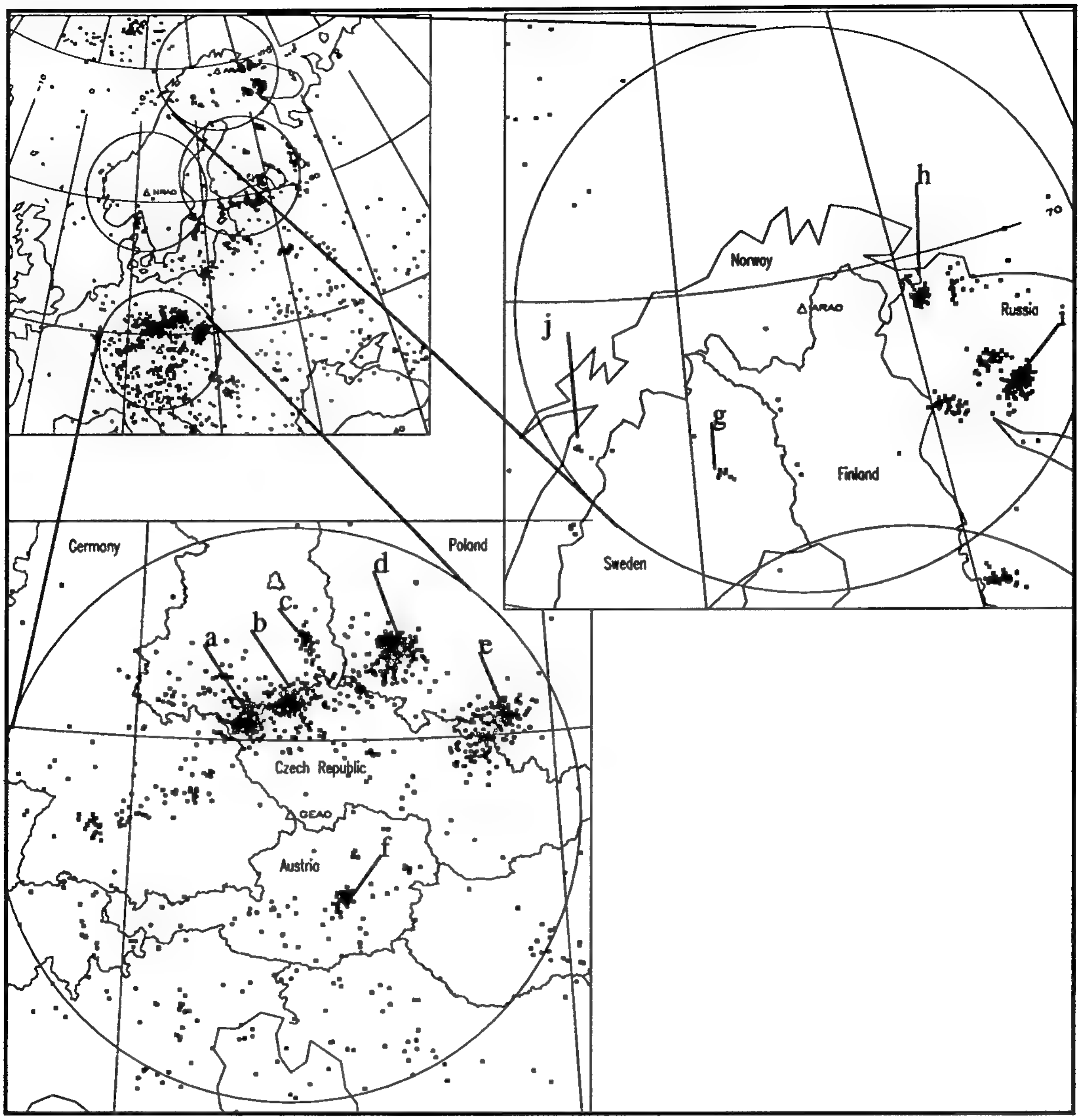

Figure 3: Seismicity near IMS2 regional arrays, ARCESS and GERESS. Six major clusters dominate near GERESS: (a) stone quarries, open-pit coal mines and earthquake swarms (b) open-pit coal mines (c) limestone quarry (d) Lubin Copper Basin underground ore mines (e) Upper Silesia underground coal mines (f) open-pit ore mines. Three major clusters dominate near ARCESS: (g) Kirunavaara and Malmberget mines (h) N Kola Peninsula, Russia (i) Apatity mining district, Russia. Cluster (a) corresponds to Dataset #1. Cluster (d) corresponds to Dataset #3. Location (j) corresponds to Dataset #2.

2.1.2 *Regional Seismicity as Recorded by GSETT-2*

The Group of Scientific Experts Second Technical Test (GSETT-2) conducted between 22 April 1991 and 2 June 1991, was an experiment in world-wide seismological data exchange from 57 globally distributed stations. During the 42 day-experiment, waveform and parametric data were continuously received and archived at the Center, where it was used to compute seismic event bulletins. Some events in Datasets #1 Vogtland and #3 Lubin occurred during the GSETT-2 experiment making other waveforms available in addition to those recorded by the IMS stations.

2.2 Recording Stations

Each of the 82 events in the GTDB were recorded by at least one of the IMS high-frequency arrays and 13 events were also recorded during GSETT-2. Figure 4 shows the recording stations for which at least one phase was associated with at least one event in the GTDB. All of the recording stations in GTDB are part of the IMS Network and/or part of the GSETT-2 Network. Table 1 lists the station code, latitude, longitude, elevation, name and geographical region of each station.

2.3 Distance Range

Figure 4 shows the path coverage of events in the GTDB. Figure 5 shows a histogram of the distance ranges. Most of the Vogtland paths are to GERESS at distances between 1.5 to 1.7 degrees. Most of the Steigen paths are to ARCESS at 4.3 degrees. Most of the Lubin paths are to GERESS at 3.1 degrees.

2.4 Magnitude Range

Local magnitudes (M_L) are stored in the GTDB for 74 of the events. The magnitude estimates come from the local experts, where available. Magnitude estimates cannot be compared between datasets because they were computed by different organizations using different systems. However, within each dataset they give an estimate of the relative sizes of the events. Figure 6 shows a histogram of the magnitude ranges for each dataset.

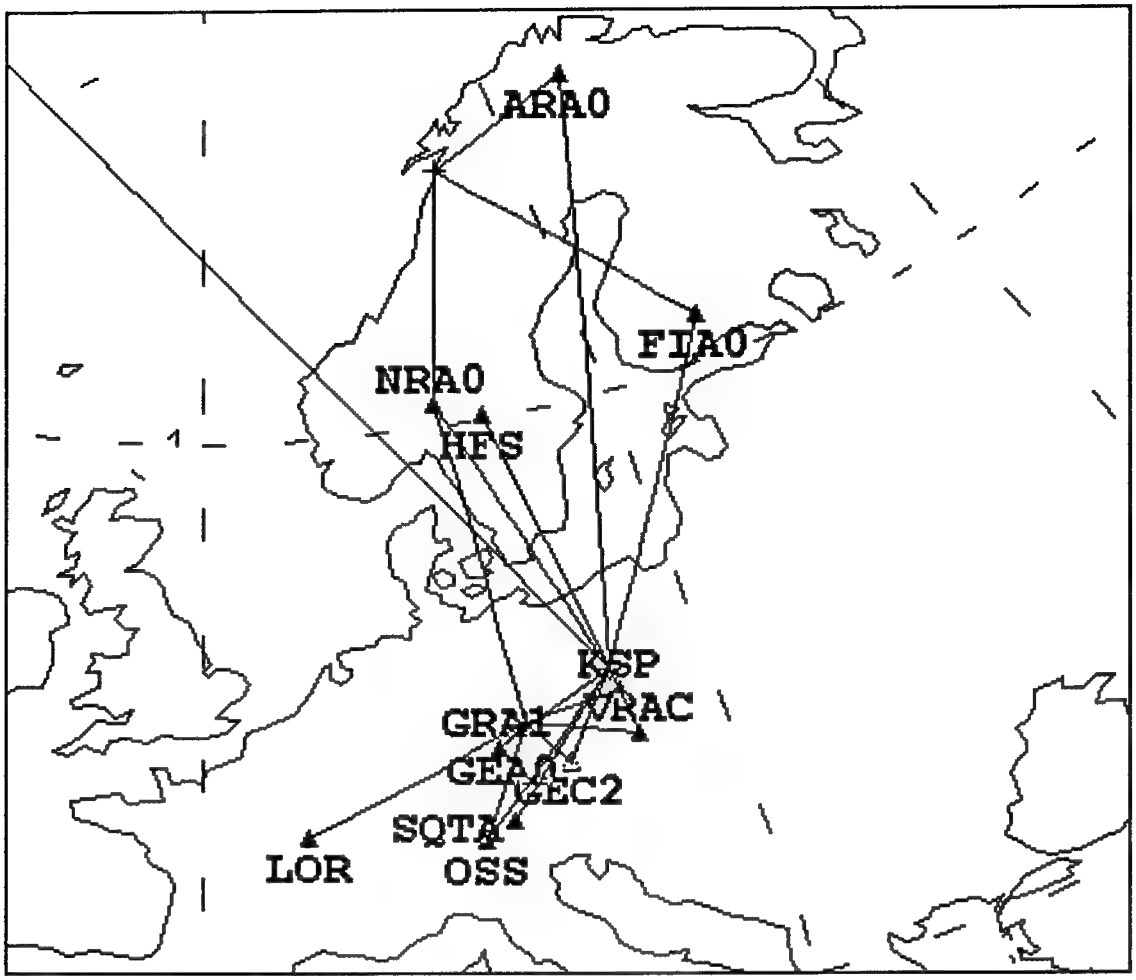

Figure 4: Stations with at least one phase associated with at least one event in the GTDB. Station YKA in Canada is not shown.

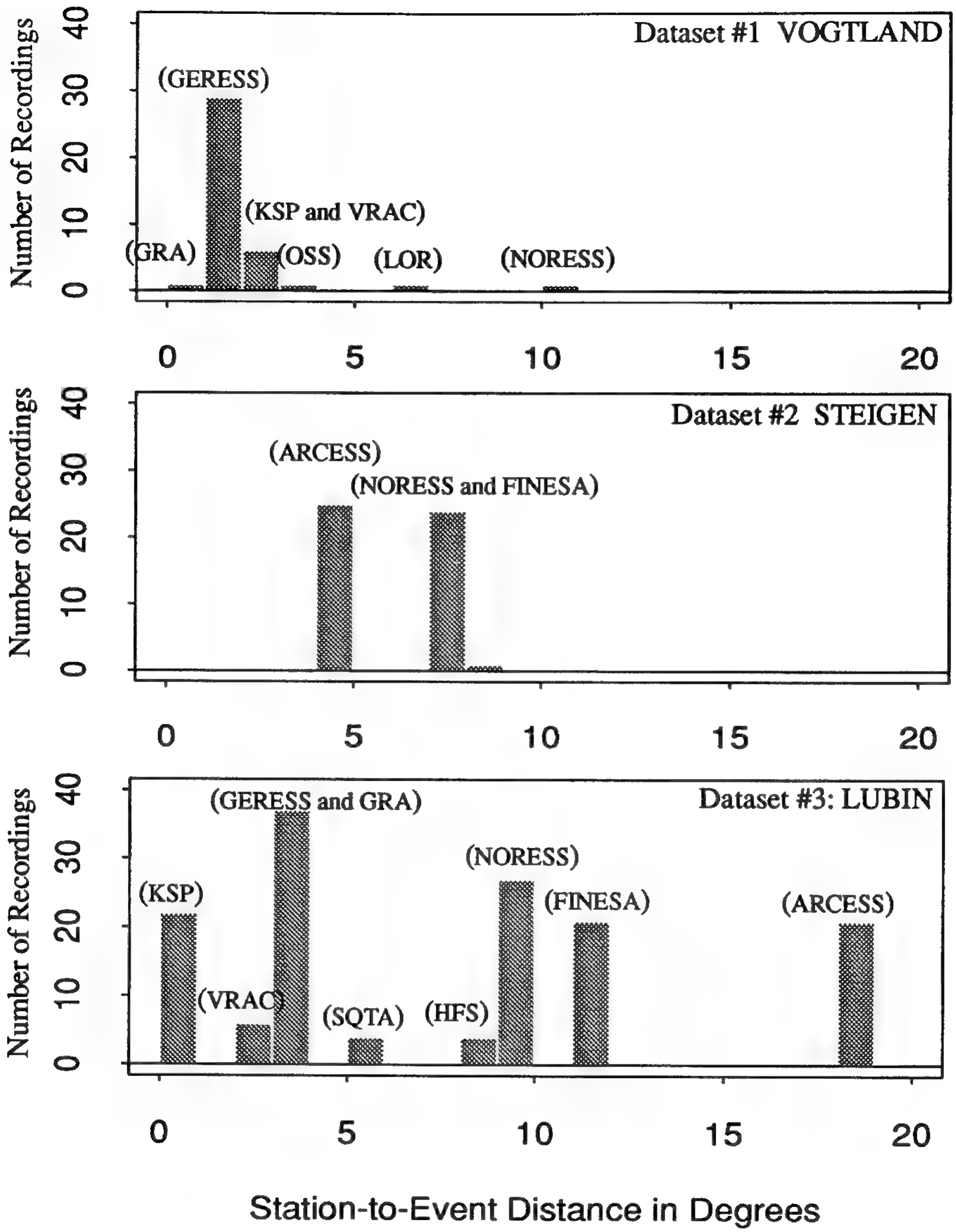

Figure 5: The majority of the Vogtland recordings are at GERESS at distances of 1.5 to 1.7 degrees. Most of the Steigen recordings are at ARCESS at 4.3 degrees. Most of the Lubin paths are at GERESS at 3.1 degrees. Lubin events are also recorded at YKA at 60 degrees (not shown).

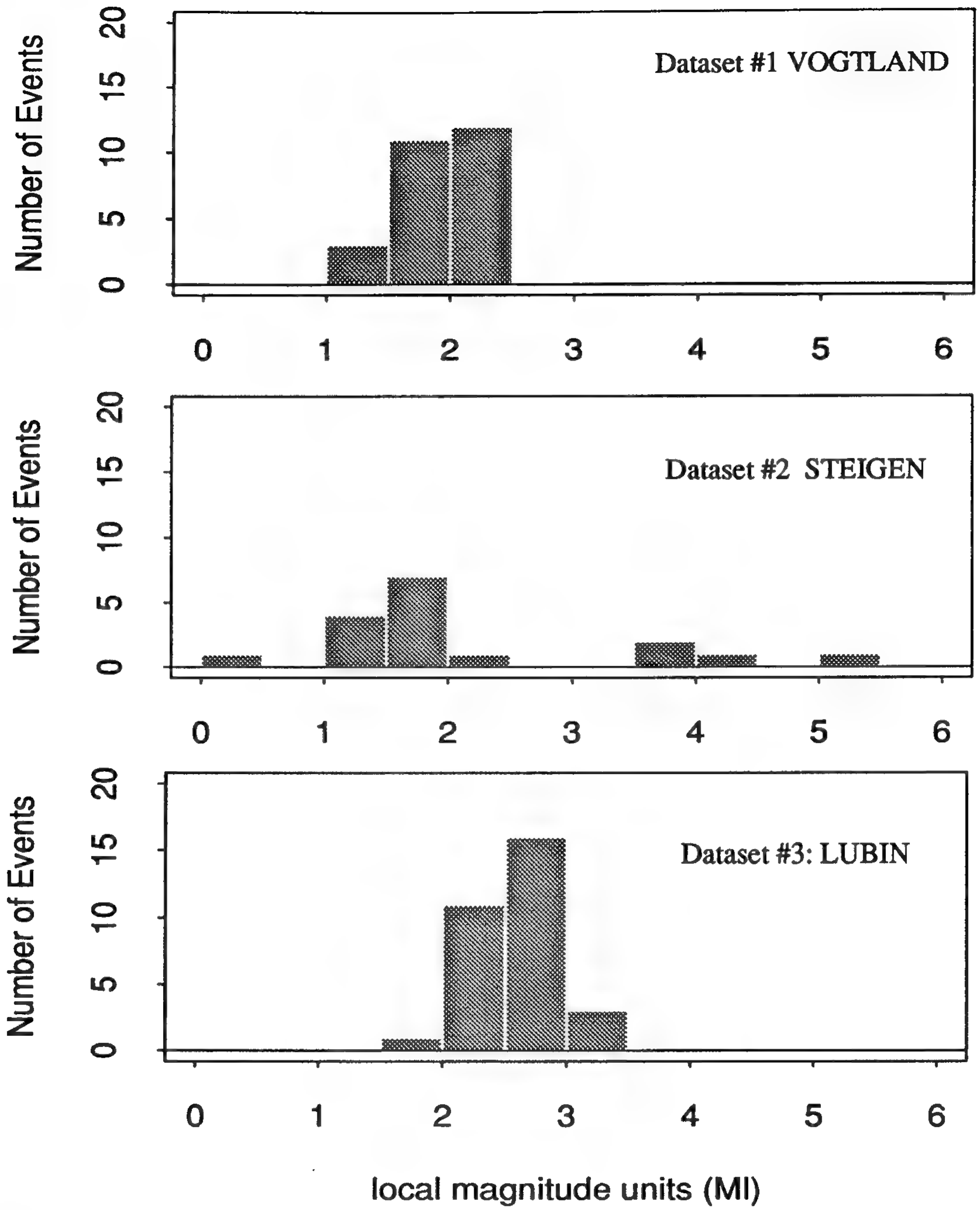

Figure 6: Histograms of local magnitudes for each dataset.

Table 1: IMS2 and GSETT-2 Stations with at least one arrival in the GTDB

Site Code	lat	lon	elevation (m)	station name	region name
ARA0	69.53	25.51	403	ARCESS ARRAY A0	NORTHERN NORWAY
FIA0	61.44	26.08	155	FINESA ARRAY A0	FINLAND
GEC2	48.84	13.70	1132	GERESS ARRAY C2	GERMANY
GRA1	49.69	11.22	500	GRAFENBERG ARRAY	GERMANY
HFS	60.13	13.70	265	HAGFORS	SWEDEN
KSP	50.84	16.29	380	KSIAZ	POLAND
LOR	47.27	3.85	520	LORMES	FRANCE
NRA0	60.74	11.54	302	NORESS ARRAY SITE A0	SOUTHERN NORWAY
OSS	46.69	10.14	1700	OVA SPIN	NORTHERN ITALY
SQTA	47.22	11.21	1307	SAINT QUIRIN	AUSTRIA
VRAC	49.31	16.60	480	VRANOV	CZECH REPUBLIC
YKA	62.49	-114.60	200	YELLOWKNIFE ARRAY	NORTHWEST TERRITORIES CANADA

Table 2: Magnitude ranges in the GTDB

Dataset	min (ml)	max (ml)	Author
#1 Vogtland (eq)	1.4	2.4	Neunhöfer
#1 Vogtland (qb)	1.8	2.2	Wüster
#2 Steigen	0.5	5.5	BERGEN
#3 Lubin	1.8	3.3	IMS2

Chapter 3: Contributors

Mr. Jan Wüster,
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Mr. Wüster's discrimination paper (Wüster, 1992) focuses on events in Vogtland region because of the proximity of the natural earthquakes to the quarry blasts. He obtained earthquake information from Dr. H. Neunhöfer and blast information from Dr. K.-D. Klinge. Dataset #1 is a subset of the events used in this study.

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Jena Institut für Geowissenschaften
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Dr. Neunhöfer is the local expert for ground-truth information on earthquakes in Dataset #1 Vogtland. His group publishes the Vogtland Regional Microearthquake Bulletin which is a compilation of results from several German and Czech institutions in the area. The earthquakes in Dataset #1 occurred within this network.

Dr. Klaus-D. Klinge
Seismologisches Observatorium Moxa
o-6841 Moxa FRG

Dr. Klinge runs some of the stations near the Vogtland area. Dr. Klinge at Moxa also keeps lists of quarry blasts, which are identified by seismic observations.

Dr. Petr Firbas
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Masaryk University Brno
Jecna 29a
612 46 Brno
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Dr. Firbas provided the information on quarry blasts in the Vogtland region through contacts with quarry operators. Dr. Firbas' institute recently installed a network well-sited for monitoring natural seismic events in the Vogtland area in the future.

Dr. S. J. Gibowicz
Institute of Geophysics,
Polish Academy of Sciences
Department of Earth Interior

Dr. Gibowicz is one of the leading experts on mine-induced tremors and acts as a consultant for mining companies on the prediction and prevention of such tremors.

Dr. Pawel J. Wiejacz
Institute of Geophysics,
Polish Academy of Sciences
Department of Earth Interior

Through contacts with Polish mines, Dr. Wiejacz has provided most of the information for Dataset #3, the Lubin events.

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Mr. Atakan is currently investigating the correlation of the Dataset #2 Steigen events with local faults. This work utilizes data collected by the network of temporary stations, installed by the University of Bergen to monitor the Steigen earthquake swarm.

Dr. Anders Dahle
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Dr. Dahle approached the mining problem in Scandinavia by sending questionnaires to local mines. The resulting mine information was organized into the two tables, **minfo** and **minex**, which he has provided to the Center (Dahle *et al.*, 1989). Dr. Dahle also confirmed for us that there is currently no active mining in the immediate vicinity of the Steigen area.

Chapter 4: Waveform Analysis

4.1 Purpose of Analysis

Waveform analysis was performed for the purpose of obtaining accurate and consistent arrival-times and phase identifications. The epicentral locations obtained as a by-product of the analysis depend on the quality of the travel-time curves and the azimuth estimates stored as parametric data during automatic processing of IMS data and were, in general, not saved. Instead, locations resulting from waveform analysis were replaced with more accurate locations (i.e. local bulletins, known mine locations) obtained from local experts where possible. However, this location information is often incomplete especially in the case of mining events where the times are of less importance to mining operations than event locations. To accommodate for this short-coming, the "hybrid" **origin** table is used, where the best information is put in each field. For example, Dataset #3 Lubin, *lat*, *lon* and *depth* in the **origin** table are from the local experts but the origin time is from the seismic waveform analysis and is subject to the assumptions described in this section. A complete explanation of what is in the **origin** table for each dataset is included in Part 2.

4.2 Method of Analysis

Because each of the 82 events in the GTDB were detected and located by the IMS, the waveform and parametric data were readily available. When a phase is detected by the IMS, *azimuth, slowness, frequency, amplitude* and other parameters are estimated and saved in database tables which are used by an expert system to identify phases and calculate initial location solutions. Coherent, incoherent and horizontal beams are computed for each initial location solution. These initial solutions are written to the account "IMS2EXP". After analyst review, the corrected events are written to the account "IMS2".

The starting point for the analysis was the initial phase identifications and location solutions from the expert system account, "IMS2EXP". For 13 events, additional waveform and parametric data was available as a result of the GSETT-2 experiment.

The Analyst Review Station (ARS, 1993) was used to interactively analyze events. All events were analyzed by one analyst, in groups by area rather than by chronological order. The advantage of analyzing a group of events with similar characteristics is that the larger events, where the phases are easier to interpret, can be used as a references when analyzing smaller events from the same area. This was especially useful in Dataset #2 (Steigen), which includes a large range of magnitudes.

The most common procedures used for adjusting the expert system event hypotheses during analysis were, in order of frequency: renaming a phase, re-timing a phase, adding a phase, and associating or disassociating a phase with an event. These actions included separating double events that were assumed to be one event by the expert system

and combining phases into one event, assumed by the expert system to be two or more events.

4.3 Rules and Assumptions

4.3.1 Travel-time curves

The IMS travel-time curves used in analysis of the GTDB are based on the plane-layered velocity model described in Table 3 (Bratt *et al.*, 1990). This model may not be

Table 3: IMS Velocity Structure for Northwestern Europe (Bratt, *et al.* 1990)

layer	thickness	P velocity (km/sec)	S velocity (km/sec)
1	16.0	6.2	3.58
2	24.0	6.7	3.87
3	15.0	8.10	4.60
4		8.23	4.68
group velocities Pg (6.2 km/sec); Lg (3.55 km/sec); and Rg (3.00 km/sec).			

appropriate for events in Central Europe where the Jeffreys-Bullen travel-time curves are often used (e.g. Schweitzer *et al.*, 1992), but the purpose of the analysis was to measure arrival times and assign phase identification, rather than to calculate origin times and locations.

4.3.2 Cross-over distance

A Pg-Pn cross-over distance of 2.0 degrees is predicted by the velocity model in Table 3 and assumed in IMS analysis. In analyzing the events in the GTDB, this simple phase interpretation for first arrivals is employed. In reality, the identification of regional phases is more complex and may vary with azimuth, especially in Central Europe where major structural boundaries occur within short distances. Interpretation of the first arrivals from events in Dataset #1 Vogtland observed at GERESS, at a distance of 1.5 degrees, may be affected by this assumption.

4.3.3 Phase Identification

Phases were renamed to correct errors made by the automatic system. The following regional phases are defined in the IMS tables and used in analysis:

Regional phases: Pn, Pg, Sn, Lg, Rg
Generic regional phases: Px, Sx

Generic phases, Px and Sx, are detections associated with the event but not identifiable as a specific regional phase. All renamed phases are updated in the **assoc** table. Phases that could not be reliably timed were not renamed. An example of this is Event 41, where the first arrival was named Px by the expert system but not renamed Pn because it could not be re-timed reliably.

4.3.4 Arrival-time picks (re-timing)

Beams were used, when available, to time arrivals on the IMS high-frequency arrays. P-type phases were timed on the coherent beam (*cb*), *Lg* phases were timed on the incoherent beam (*ib*), and *Sn* phases were timed on the horizontal beam (*hb*). Whenever beams were not available, vertical single channels (*sz*) were used to time all phases except *Sn* which was timed on the *sn* and *se* channels.

Phases were re-timed up to a maximum of four seconds (in either direction). Beyond the four-second maximum, the signal was assumed to be a new phase, which was added at the observed time (these new phases do not have velocity and azimuth information). When a phase is re-timed, the new time is updated in the **arrival** table. Events 6, 7, 8, 12 and 13 of Dataset #1 Vogtland are examples where the correct first arrival is more than four seconds earlier than the first arrival picked by the detector, and where the analyst added a new arrival rather than re-timing.

Waveforms from a particular station were generally not stored in the GTDB database unless an associated arrival was picked on the waveform from that station. In the current version, you may not see all the CSS waveforms for IMS2 and GSETT-2 for a particular event. However, you will see all of the CSS data for a particular event if a phase was picked. For example, in Dataset #3 Steigen, none of the GERESS data were included after it was determined that no phases from the four largest events were visible at GERESS. This policy will be changed in future ground-truth datasets to include all data that falls in the correct time window regardless of whether a phase is visible.

4.3.5 Adding phases

Phases were added either when the detector missed a phase or when the phase closest to the true time was more than four seconds from the true time. At distance ranges where two P-type phases are recorded and the first-arriving phase has a very small amplitude, it is sometimes hidden in the noise and missed by the detector. In these cases, the first P-phase is added if it can be accurately timed. Otherwise, it is not added and the (correctly identified) second-arriving P-phase is, by default, the first arrival. Examples of this are Steigen event 29, 32 and 34 (see "PART 3: Event Plots" on page 48). Phases that

could not be reliably timed to within two seconds were not added. So for each associated phase, the time is believed to accurate to within two seconds.

Chapter 5: Quality Of Waveform Data

Several categories of faulty waveform data were encountered while reviewing the data in the GTDB. Data problems included glitches, data gaps, missing channels, constant data value traces (dead traces), and channels dominated by quantization noise. In Version 1 of the GTDB, elimination of faulty waveforms channels was addressed but was not carried out in a uniform way. The decision on whether or not a faulty channel should be eliminated was made on an individual and somewhat subjective basis. Basically, all data was kept in the GTDB unless it was deemed too bad to be useful after processing.

On the one hand, it is efficient to delete bad waveforms so that future users of the data will not have to repeat the process; on the other hand, the data is representative of data quality from the Center's CDR and any systems which process data should be able to handle data with these problems. One solution might be to summarize the faulty channels in a database relation for optional use by other programs. Although the IMS processing software, excludes faulty channel data before creating beams used in parameter extraction, a table of bad channels is not saved after processing.

Figure 7 is an example of data that was not included in the GTDB because of poor quality. The figure shows all channels of the ARCESS array data for Event 36. The top three traces, from site ARC4, were not included in the **wfdisc** table of the GTDB (this data still exists as part of the IMS2 database). ARC4 experienced many problems in early 1992 and was excluded from ten of the Steigen events. The traces plotted in Figure 8 are examples of data included in the GTDB despite poor quality. This is the FINESA data for Event 75.

During the time period covered by events in Datasets #1 (Vogtland) and #3 (Lubin), GERESS data is subject to glitches and data gaps that have been documented by Golden *et al.*, 1991 and Teledyne Geotech, 1991. Examples of these types of data problems are obvious in the Event Plots in Part 3. Figure 9 is an example of another type of problem with GERESS data. The trace labeled GED4/sz is not seismic data but rather "artificial data", purely electronic in origin. It affects GED4/sz and GEA2/sn intermittently and is corrected by manual resetting at the station GERESS (Jost, 1993).

Beams resulting from IMS processing were included in the GTDB for display purposes. These beams, which are based on the initial (expert system) location, are simply an artifact of processing. There is no way to easily and readily reproduce these beams, and they were only intended to be kept for display purposes in the final IMS databases. In some cases, a detection is only visible on the beam.

Future policy regarding faulty waveform data will be to retain all data, regardless of its condition. This will save time in reviewing and processing future versions of the GTDB. It is expected that any processing system using waveform data should be able to handle problems with bad data.

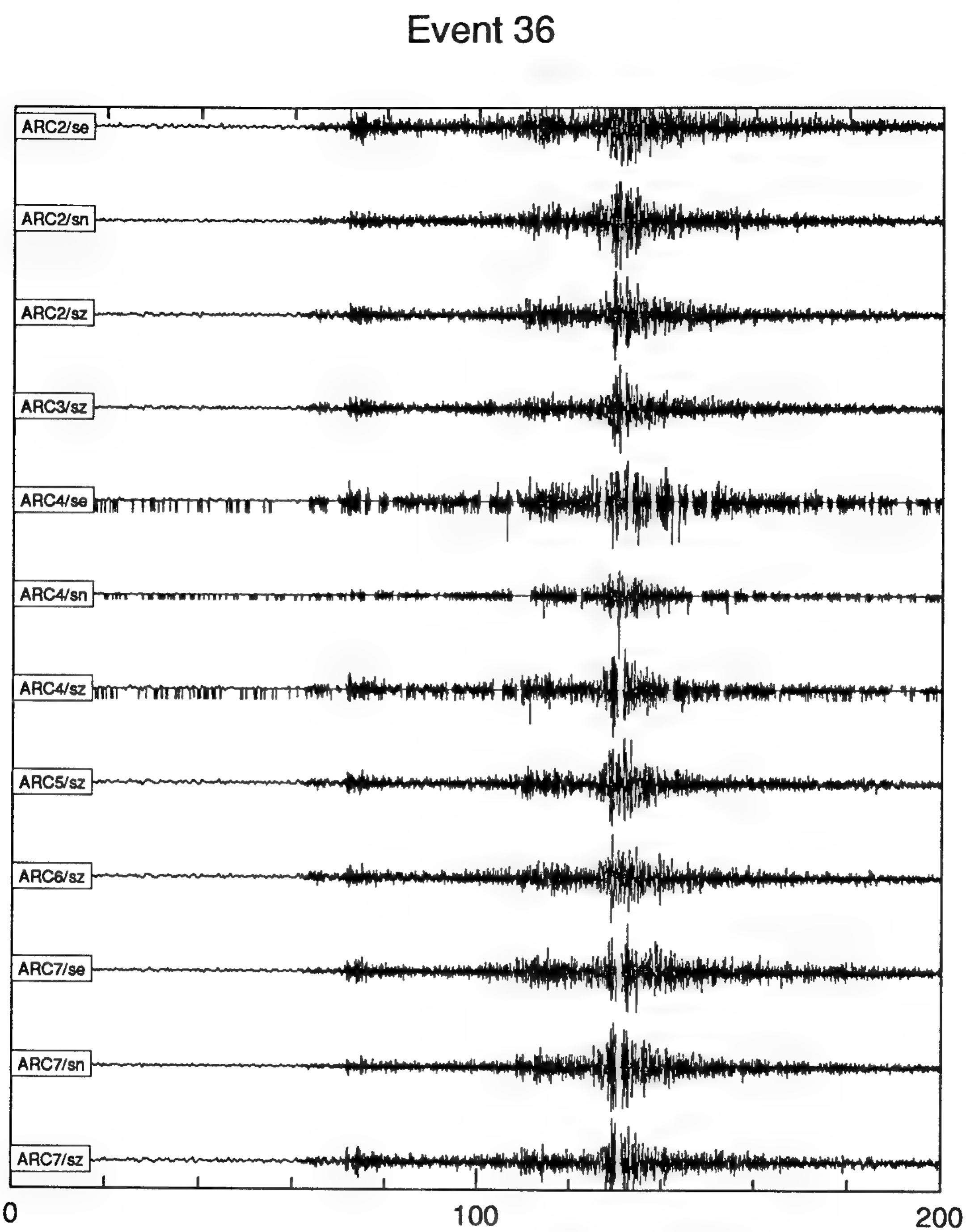

Figure 7: Example of faulty waveform data excluded from GTDB. The plot shows samples of ARCESS data for Event 36. ARC4 was excluded from the GTDB because of glitches.

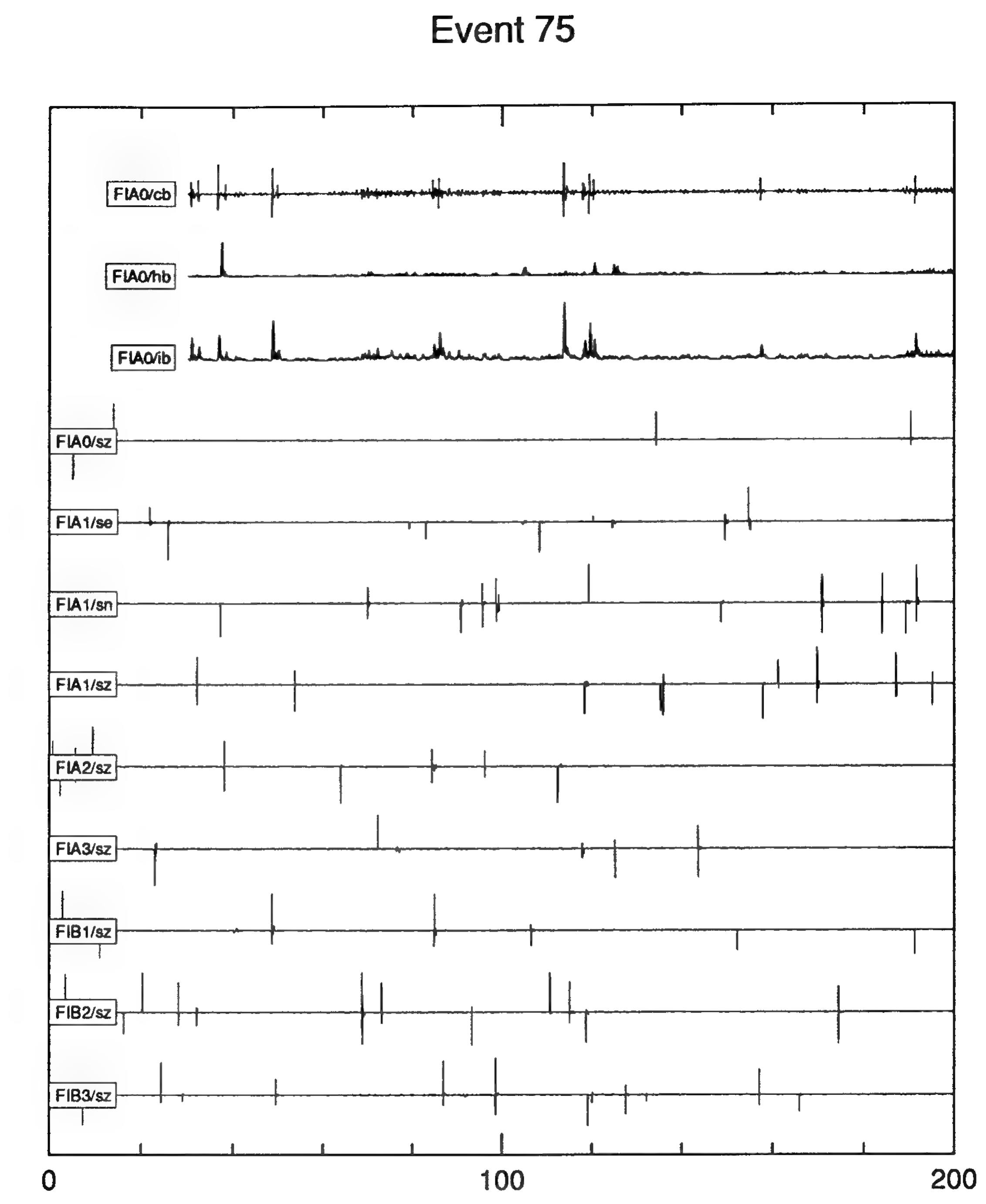

Figure 8: Example of faulty waveform data included in the GTDB. Plot shows samples of FINESA data from Event 75.

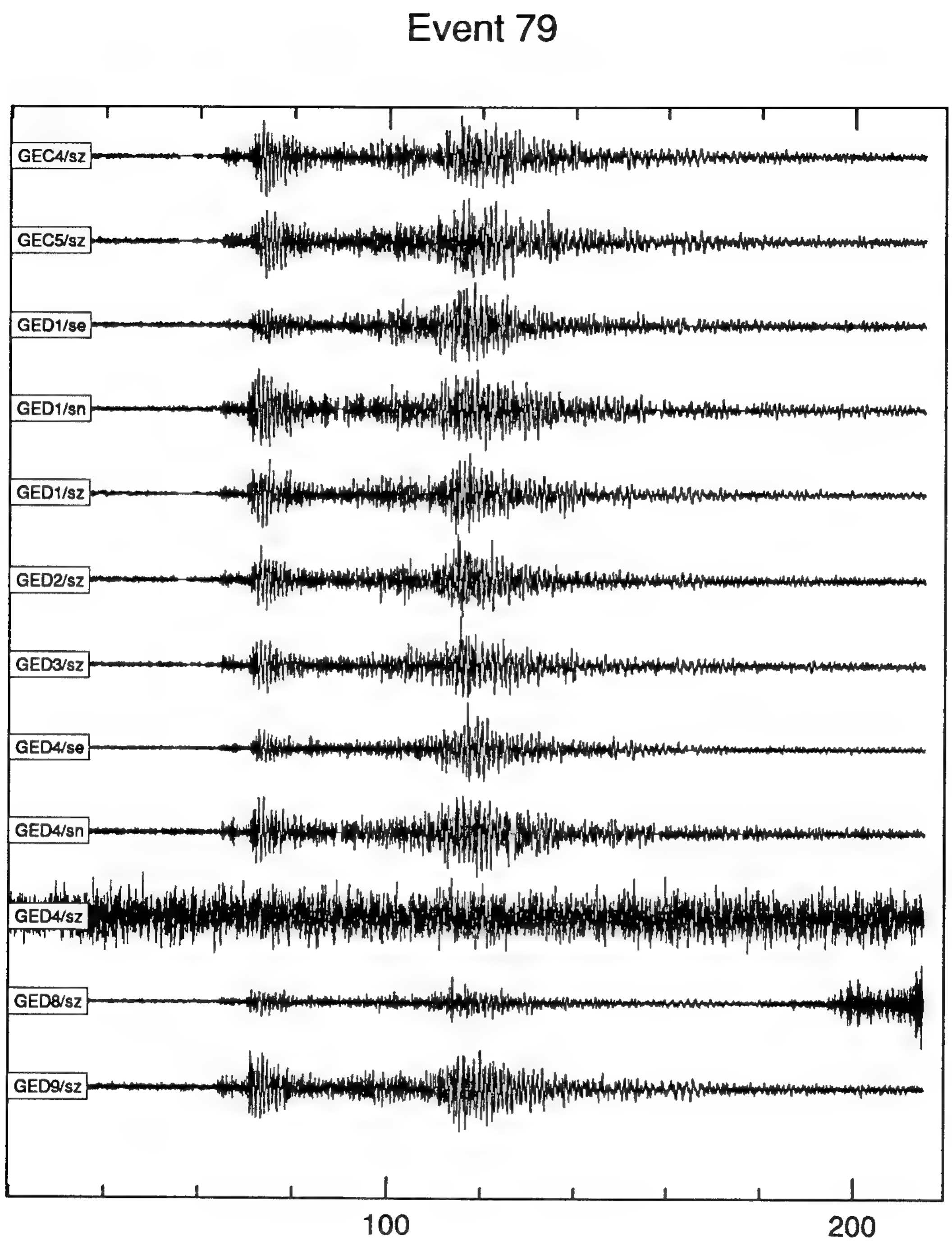

Figure 9: Example of faulty waveform data included in the GTDB. Channel sz of Station GED4 is bad.

Chapter 6: GTDB Schema

Primary components of the GTDB schema are shown in Figure 10: all waveforms are stored on optical disc as part of the Center's Central Database Repository (CDR); relations (tables) are represented by boxes; primary keys (identification numbers) are shown in italics in the shaded areas.

An attempt was made to draw from the experience of others in designing new schema, relying on standard CSS Version 3.0 schema (Anderson *et al.*, 1990) where possible. Tables outlined in bold in Figure 10 are "core" tables described the in CSS 3.0 Schema for storing location solutions (**origin**), phase parameters (**arrival**), waveform headers (**wfdisc**), links between event solutions and waveforms (**wftag**), and links between event solutions and phases (**assoc**). These tables are used as specified by the CSS 3.0 schema with the exception of the **origin** table which was modified to store location information from different sources of ground truth, as described below.

The **minfo** and **minex** tables were originally proposed by Dahle, *et al.* (1989) and have been incorporated into the GTDB schema for storing mine information, and blast information respectively. All other tables in the figure were developed specifically for the GTDB for storing notes about events (**notebook** and **notelink**), bibliographic information for sources of ground-truth (**reference**), and mapping to identification numbers in other CSS database accounts (**xtag**).

- **origin table - modified CSS 3.0**

Modified usage of the CSS 3.0 **origin** table allows for information in the fields to come from different data sources (i.e. seismic bulletins, personal communication, etc.) so that the table contains the best information available in each field. For example, this "hybrid" **origin** table may contain latitude and longitude information from a mining seismic network and local magnitude estimates from the IMS2 account at the Center.

The most important piece of information in the GTDB is the event type, stored in the *etype* attribute (field) of the **origin** table. The CSS 3.0 schema defines the range of *etype* attributes as in Table 4. To accommodate varying levels of information and confidence, the scope of the *etype* attribute has been expanded for the GTDB as shown in Table 5. Expansion of the *etype* attribute gives the user a qualitative summary of confidence to place on the event type and an indication of whether additional information is available.

The designation **qb** indicates that the mine or quarry has confirmed the shot and there is no other ground-truth information available. The **qb+** designation means the quarry has confirmed the shot and has given at least some specifics of the blast design, usually from the blaster's logs (e.g., Chapman *et al.*, 1991). The **qb++** designation is reserved for the few experimental quarry or mine shots that have been observed and fully documented by seismologists or mining engineers for research purposes (e.g., Reamer and Stump, 1992).

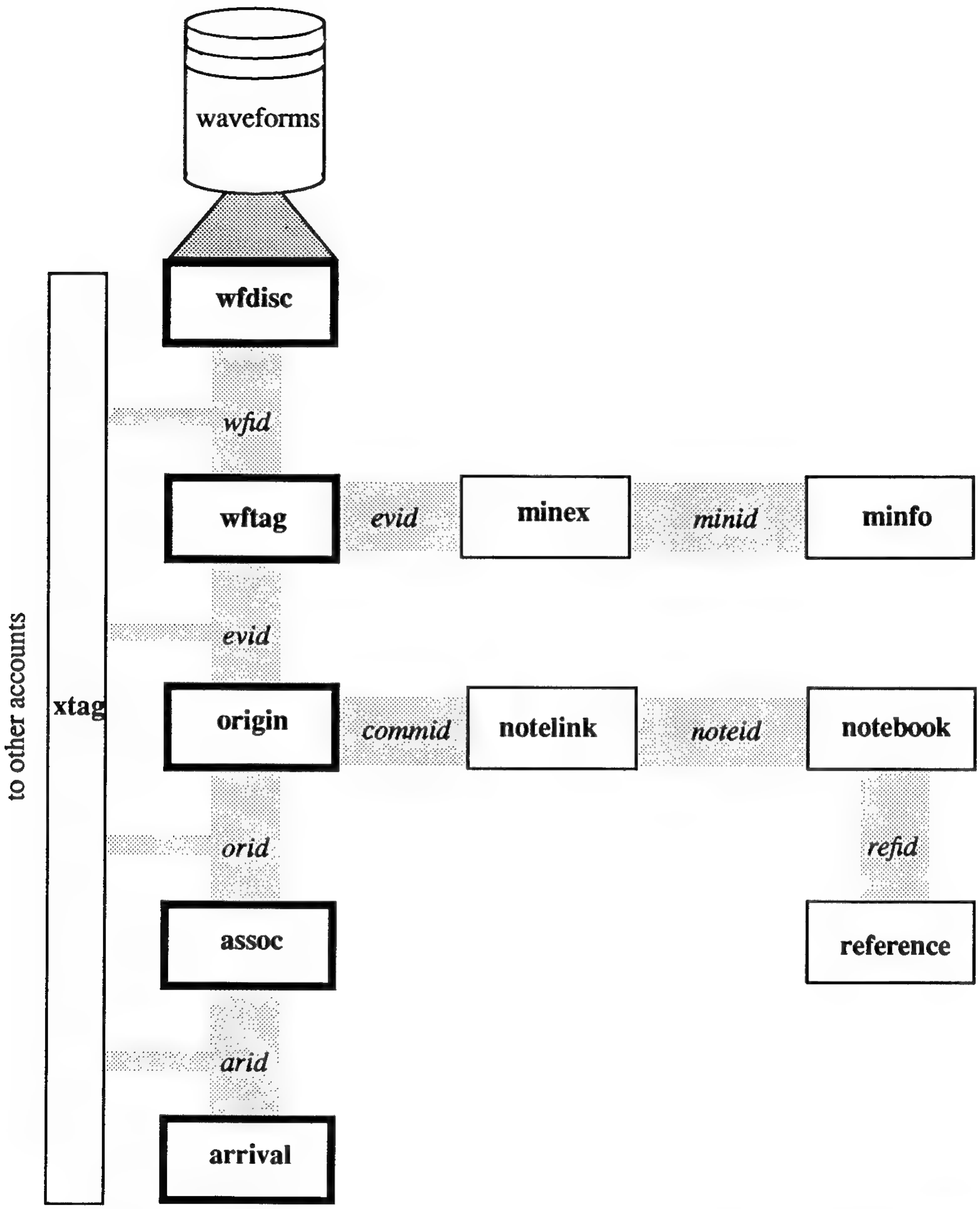

Figure 10: Primary components of the GTDB. Boxes represent relations (tables). Shaded areas represent links between relations made by identification numbers (*wfid*, *evid*, *orid*, *arid*, *minid*, *commid*, *noteid* and *refid*). The **xtag** table maps id's between the GTDB and other database accounts. All waveforms are stored on optical disc and are pointed to by the **wfdisc** table.

Table 4: Range of *etype* in CSS 3.0 Schema

etype	description
qb	Quarry blast or mining explosion
eq	Earthquake
me	Marine explosion
ex	Other explosion
o	Other source of known origin
l	Local event of unknown origin
r	Regional event of unknown origin
t	Teleseismic event of unknown origin

Table 5: Range of *etype* in GTDB Schema

etype	description
qb	Quarry or mine blast confirmed by quarry
qb+	Quarry or mine blast with designed shot information- ripple fired
qb++	Quarry or mine blast with observed shot information- ripple fired
qbx	Quarry or mine blast - single shot
qmt	Quarry or mining-induced events: tremors and rockbursts
ex	Explosion of known origin; i.e. exploration, construction, calibration
nu	Nuclear explosion
nc	Nuclear cavity collapse
eq	Earthquake
eq+	Earthquakes in a swarm or aftershock sequence
eq++	Felt earthquake
o	Other source of known origin
u	Undetermined or conflicting information

Similarly for earthquakes, there are different designations for different levels of ground-truth. Examples of the lowest level of confidence for earthquakes, **eq**, are single events denoted “Earthquake” in regional seismic bulletins. Earthquake identifications based on their temporal and spatial relationships to a known earthquake, such as swarms and aftershock series are denoted **eq+**. The highest level of confidence, **eq++**, refers to earthquakes that are very well documented as felt earthquakes where the possibility of cultural sources has been ruled out by macroseismic information.

All mining induced seismic events are denoted by the *etype* **qmt** (quarry or mine tremor). This classification includes both rockbursts and mine tremors. The occurrence of two types of mining-induced seismicity is well documented by several authors. Gibowicz (1984) attributes the distinction between types of mining-induced events to work by Hurtig *et al.* (1979): “mining-induced shocks caused directly by sudden failure of brittle rocks in a stope [excavation] area, resulting from stress concentration around the excavations, and seismic events in mining districts where a tectonic stress field and additional mining-induced stresses are the main factors generating mining tremors.” Events of the first type are rockbursts, i. e., they actually have some effect on the tunnel such as the collapse of a cavity or thrusting of coal seams into a tunnel. Because these events are the source of much of the danger and destruction in underground mining operations, they are very closely monitored by the mine operators, often by seismic instrumentation at depth in the mines. Events in the second group involve tectonic stress release, are generally larger, infrequent, and deeper than the working level of the mine. Several large mining tremors ($ml > 4.0$) in Poland are documented by Gibowicz (1984). As currently defined in the GTDB, the *etype* field distinguishes between blasts (**qb**) and any other type of mining induced seismicity (**qmt**), where the latter is defined broadly as an event which would not have occurred without the presence of mining in the area.

• **arrival table - standard CSS 3.0**

The arrival table contains summary information on seismic arrivals. The input arrivals originally came from the IMS2 expert system account (IMS2EXP) or the GSETT-2 initial event list account (WASIEL) and have been renumbered with the original identification numbers and account names saved in the **xtag** table. CSS 3.0 Schema calls for the *iphase* in **arrival** to be the initial phase id rather than the analyst’s phase id. The analyst’s phase id is in the *phase* attribute of the **assoc** table.

• **assoc table - standard CSS 3.0**

The **assoc** table associates arrivals with location solutions in the **origin** table. The final analyst’s phase identification is in the *phase* attribute. Regional phases are Pg, Pn, Sn, Lg, Rg, unidentified P-type, Px, and unidentified S-type, Sx. Teleseismic phases, P, PP, PcP, S, and unidentified teleseismic phase, Tx are also contained in the GTDB **assoc** table.

• **notebook table - new**

The **notebook** table is a list of notes, linked to tuples in other tables by the *commid* attribute. The design is intended to make the notes standardized by assigning an identification number, *noteid*, to each note. This makes queries easier because they are done on numbers rather than characters. It is keyed to the origin table by *commid.* The reference identification number, *refid*, points to a tuple in the **reference** table, indicating the source of the note. Table 6 specifies the new relation .

Table 6: notebook table

Relation: **notebook**
Description: notes and comments

attribute name	field no.	storage type	external format	character position	attribute description
noteid	1	i4	i8	1-8	note id
note	2	c80	a80	10-89	free format note
refid	3	i4	i8	91-98	reference id

• **notelink table - new**

The **notelink** table links notes from the **notebook** table to tuples in other relations. It is keyed on *commid*, which is part of the **arrival, assoc**, **origin**, **wfdisc** and **wftag** tables. The new relation is shown in table 7.

Table 7: notelink relation

Relation: **notelink**
Description: links *notes* from **notebook** table to tuples in other tables

attribute name	field no.	storage type	external format	character position	attribute description
commid	1	i4	i8	1-8	comment id
noteid	2	i4	i8	10-17	note id

• **minfo table - A. Dahle *et al.*, 1989**

The **minfo** relation stores summary information about each mine. The attributes are shown in Table 8.

Table 8: minfo relation

Relation: **minfo**
Description: information about mines

attribute name	field no.	storage type	external format	character position	attribute description
minid	1	i4	i8	1-8	mine id
minam	2	c15	a15	10-24	name of mine
lat	3	f4	f10.5	26-35	latitude (geodetic)
lon	4	f4	f10.5	37-46	longitude(geodetic)
elev	5	f4	f9.5	48-56	surface elev. (km)
prodpt	6	f4	f9.5	58-66	production depth (km)
mintyp	7	c15	a15	68-82	mine type
prodct	8	c20	a20	84-103	product
geolog	9	c30	a30	105-134	bedrock geology
firprc	10	c40	a40	136-175	firing practice
auth	11	c15	a15	177-191	author

• **minex table - A. Dahle *et al.*, 1989**

The **minex** relation stores information about individual mine or quarry blasts. Although its design provides for specifying one tuple for each charge in a ripple-fired shot, very little information of this detail is currently available in the GTDB. It is anticipated that these tables will be very useful in building future datasets.

Table 9: minex relation

Relation: **minex**
Description: links shot information to waveforms (*evid* as *tagid* in **wftag**) or to origins (*evid* in **origin** table), also to mines (*minid* in **minfo** table).

attribute name	field no.	storage type	external format	character position	attribute description
evid	1	i4	i8	1-8	event id
time	2	f8	f15.3	10-24	epoch time of explosion
jdate*	3	i4	i8	26-33	shot date (julian)
minid	4	i4	i8	35-42	mine id
depth	5	f4	f9.4	44-52	shot depth (km)
elev	6	f4	f9.4	54-62	surface elevation (km)
lat	7	f4	f10.5	64-73	latitude (geodetic)
lon	8	f4	f10.5	75-84	longitude (geodetic)
extyp	9	c15	a15	86-100	type of explosive
grade	10	f4	f9.4	102-110	strength relative tnt
nex	11	i4	i8	112-119	tot no. charges in ripple
subnex	12	i4	i8	121-128	actual charge number
delt	13	f4	f9.3	130-138	delay rel. first charge (ms)

* slight change from the proposed attribute, *dat*

• **reference table - new**

The **reference** table stores bibliographic information for scientific articles, books, seismic bulletins, technical reports and personal communication. It is keyed on *refid* where the *refid* is listed in the **notebook** table.

Table 10: reference relation

Relation: **reference**
Description: bibliographic information

attribute name	field no.	storage type	external format	character position	attribute description
refid	1	i4	i8	1-8	reference id
author	2	c100	a100	10-109	author
year	3	i4	i8	111-118	year of publication
month	4	c9	a9	120-128	month of publication
title	5	c160	a160	130-289	title
journal	6	c40	a40	291-331	journal name
pub	7	c25	a25	333-357	publisher
ed	8	c25	a25	359-383	editor
place	9	c25	a25	385-409	location of publication
volume	10	i4	i8	411-418	volume number
num	11	c25	a25	420-444	report number
fstpg	12	i4	i8	446-453	first page
lstpg	13	i4	i8	455-463	last page
totpg	14	i4	i8	465-473	total pages
note	15	c60	a60	475-535	additional comment, free form text

• **xtag table - new**

The **xtag** table was developed for the purpose of mapping tuples copied from other database accounts after they have been renumbered in the GTDB. For example, parts of the IMS2 **arrival** table were copied into the GTDB account and renumbered with new *arids*. With the **xtag** table, it is possible to go back to the original IMS2 **arrival** table and compare arrivals in that account and the GTDB. In the example in Table 12, *arid* 4 (*thisid*) is the same as arid 702181 (*thatid*) in the IMS2EXP account:

Table 11: xtag relation

Relation: **notelink**
Description: links *notes* from **notebook** table to objects in other tables

attribute name	field no.	storage type	external format	character position	attribute description
thisid	1	i4	i8	1-8	identification number in GTDB
thatid	2	i4	i8	10-17	identification number in other database account
thisname	3	c8	a8	19-26	attribute name in GTDB
thatname	4	c8	a8	28-35	attribute name in other database account
dbname	5	c20	a20	37-54	name of other database account
lddate	6	date	a17	56-72	load date

Table 12: Example of xtag relation

thisid	thatid	thisname	thatname	dbname	lddate
4	702181	arid	arid	ims2exp	22-OCT-92

• **wfdisc table - standard CSS 3.0**

The **wfdisc** table is the waveform header file for waveforms stored on optical disc. Wfdisc tuples were originally copied from the IMS2 and WASCEL (GSETT-2) accounts and have been renumbered. A new table, named **xtag**, contains the mapping of new *wfids* to old *wfids* and their respective database names.

• **wftag table - standard CSS 3.0**

The wftag table maps waveforms to location solutions in the **origin** table. Events in the GTDB are tagged to *both evid* and *orid* so there are two entries for each *wfid,* as shown in Table 13.

Table 13: Example of wftag relation

TAGNAME	TAGID	WFID	LDDATE
evid	1	22	21-OCT-92
orid	100	22	21-OCT-92

PART 2: DATASETS
Chapter 1: Dataset #1: Vogtland

Event type

9 natural earthquakes in a swarm (*etype* = **eq+**)
2 natural earthquakes (*etype* = **eq**)
15 confirmed quarry blasts (*etype* = **qb**)

Significance of this dataset

This dataset is unique because quarry blasts and natural earthquakes occur close together in this region. The distance between the average epicenter of the quarry blasts and the average epicenter of the earthquakes is 34 km. These events are the subject of a discrimination study by Wüster (1992).

Location

Events in Dataset #1 straddle Germany and the Czech Republic in a region of western Bohemia known as Vogtland, about 180 km northwest of the GERESS array as shown in Figure 11. The earthquakes occur within a dense network of stations operated by several German and Czech institutes. Earthquake locations are from the compilation of these local bulletins into the Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes (PB) (Neunhöfer, 1992). Some of the stations are shown by triangles in Figure 11. The quarry blasts are associated with three Czech mines near the town of Karlovy Vary, shown by squares in the figure.

Depth

All blasts are at the surface, either in open-pit coal mines or stone quarries. Earthquake depths are between 9 and 13.9 km (Neunhöfer, 1992). Although the nearest station contributing to the earthquake locations was at a distance of about six km, there is some uncertainty about earthquake depths as they are presented in the Preliminary Bulletin. Initial results from a new local array in the area suggest the typical depth is closer to 6-8 km (Firbas, personal communication).

Historical seismicity

The Vogtland area was the site of a large shock (4.5 ml) and about 10,000 aftershocks in 1985 and 1986 (Bormann, 1989).

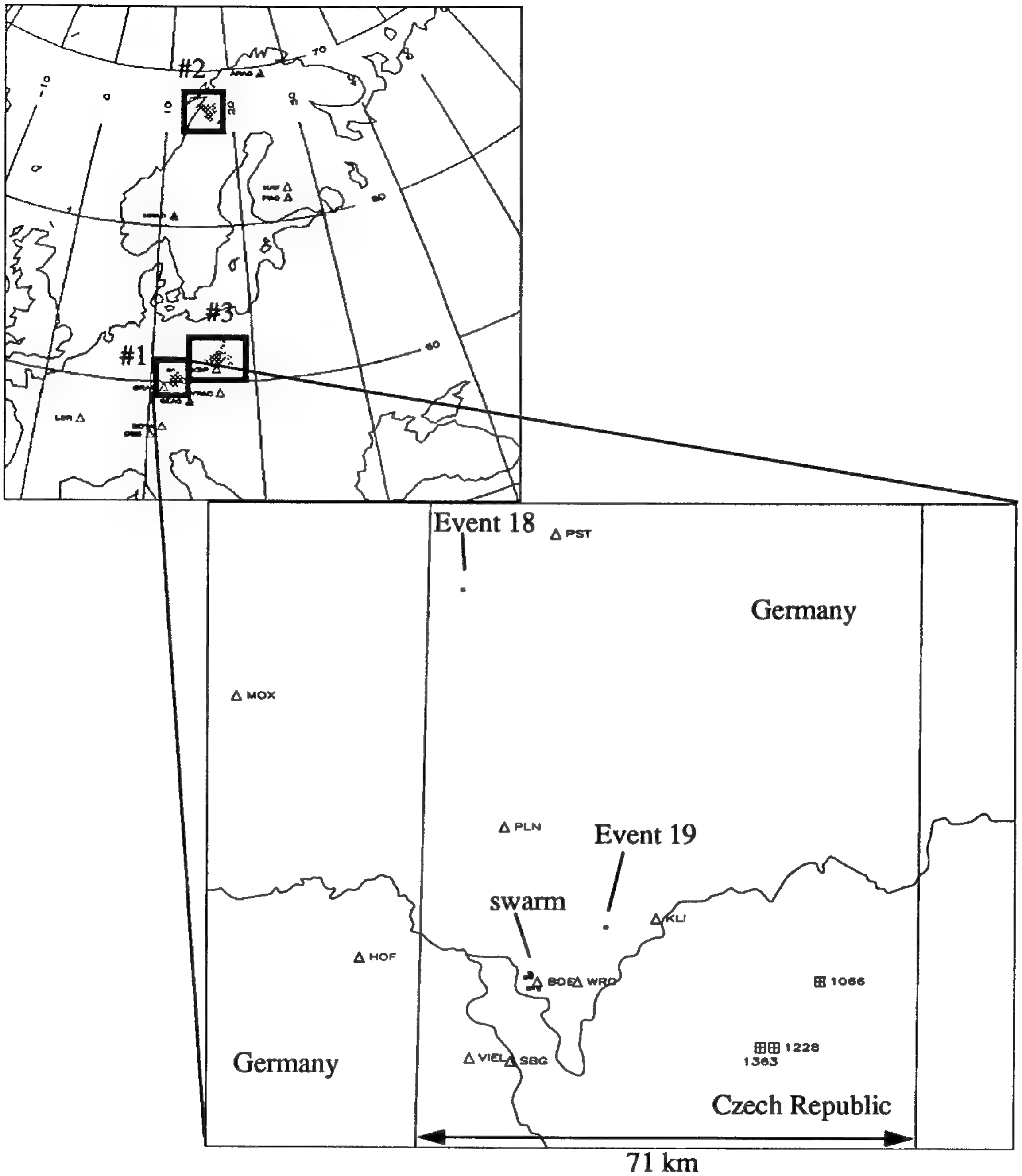

Figure 11: Dataset #1 Vogtland includes nine events from an earthquake swarm plus two single earthquakes, events 18 and 19. Blasts are recorded at the Depoltovice stone quarry (1066) and two open pit coal mines: Nove Sedlo (1228) and Vintirov (1363). Some of the stations contributing to the Preliminary Bulletin of the Vogtland /West Bohemia Microearthquakes for 1991 (Neunhöfer *et al.*, 1992) are shown by triangles.

Observing stations

The earthquakes occurred within a dense network of German and Czech stations with the nearest station, WRG, located about six km from the earthquakes. Waveform data from this network is not part of the GTDB.

All events in Dataset #1 are recorded at GERESS; six at KSP; two at VRAC and one (earthquake) is recorded at NORESS.

Outstanding problems

Depth uncertainty of earthquakes has not been quantified.

Contributors:

The following local experts are listed in Chapter 3.0: P. Firbas, K.-D. Klinge, H. Neunhöfer, J. Wüster. P. Firbas provided the information on quarry blasts from examination of the mining records. H. Neunhöfer provided the Preliminary Bulletin of Earthquakes in the Vogtland region.

Pending additional information:

The final Bulletin of Microearthquakes from the Vogtland Region, to be published by Neunhöfer *et al.* will include locations, times and magnitude estimates.

Ground-Truth Information for Dataset #1

Information about the events is summarized in Tables 14 and 15, listed by attribute and relation (database table). Earthquake and quarry blast information is presented separately because the ground-truth information is from different contributors.

Bonus Events

Orids 210, 126 and 229 are not part of the ground-truth database and are included only because they are regional events which appear in the waveforms of this database. *Orid* 210 is a regional event occurring 26 seconds before Event 1. *Orid* 126 is a teleseismic event located in Fiji Islands and reported as a felt earthquake by the NEIC. *Orid* 229 is a regional event occurring 89 seconds after Event 20. The location solutions for these three events are shown in Table 16.

Table 14: ***Ground-Truth Information for Dataset #1: Vogtland earthquakes*, Events 5-13; 18, 19**

attribute	**relation**	ground-truth	contributor
etype	**origin**	**eq+, eq**	Neunhöfer
lat, lon	**origin**	from the Preliminary Bulletin (PB) of Vogtland/West Bohemia Microearthquakes for 1991	Neunhöfer
depth	**origin**	9 - 13.9 km; from PB; large error, stored in ORIGERR	Neunhöfer
ml	**origin**	1.40 - 2.37; from PB	Neunhöfer
origin time	**origin**	derived from GEC2 first arrival times after analysis (at CSS) and locations in PB, assuming J-B travel-time curves.	Grant
exception		Event 18 was listed but not located in PB, location is from Wüster, 1992.	Wüster

Table 15: Ground-Truth Information for Dataset #1: Vogtland quarry blasts, Events 1-4;15-17;20-27

attribute	relation	ground-truth	contributor
etype	**origin**	**qb**	Firbas
lat, lon	**origin**	based on center of quarry location, Petr Firbas	Firbas
depth	**origin**	0 km	Firbas
ml	**origin**	range 1.93 - 2.15.	Wüster
origin time	**origin**	derived from GEC2 first arrival times after analysis, locations as above, and assuming J-B travel-time curves.	Grant
minam	**minfo**	mine name is known for the quarry blasts: 8 from Vintirov brown coal open pit mine (minid 1363); 5 events from the Nove Sedlo open pit coal mine (minid 1228); and one event from the Depoltovice stone quarry (minid 1066).	Firbas
totcha	**minex**	total charge is listed for most of the blasts	Firbas
exceptions		Event 16 was identified on basis of seismic observations (by K.-D. Klinge) and not confirmed by P. Firbas. Location is that of nearby seismic station, SGB.	Klinge

Table 16: Bonus Events, Dataset #1

orid	date	origin time	lat	lon	depth	mb	auth
210	03/11/91	12:02:29	50.29	12.69	0	-999	ARS:flori
126	03/24/91	06:39:22	-16.83	177.30	12.0	5.2	USGS/ MON
229	05/23/91	11:02:07	49.67	12.24	0	-999	ARS:flori

Chapter 2: Dataset #2: Steigen

Event Type

18 earthquakes in a swarm (*etype* = **eq+**)
7 felt earthquakes (*etype* = **eq++**)

Significance of this dataset

Most of the events larger than magnitude 3.0 (coda-wave magnitude) were felt by local residents in the within a 20-km radius of the epicenters (Atakan *et al.*, 1993). Unlike many of the earthquakes in northern Norway, these earthquakes are nearly on land, making the path to the IMS regional arrays more comparable to that of blasts in the area.

Location

Events in Dataset #2 are located in northern Norway in the Steigen area within a 10-km area centered in Brennvika Bay (Atakan *et al.*, 1993). Figure 12 shows the locations.

Depth

Bergen bulletin solutions for the majority of these events are at a fixed depth of 12 km. NEIS solutions are at fixed depths of 10 for the events listed.

Observing stations

The location solutions reported in the Bergen bulletin are based on the northern Norway seismic network, SEISNOR, consisting of six stations operational since 1987: KTK, TRO, LOF, MOR, NSS, MOL. The network is operated by the university of Bergen and funded by a consortium of oil companies interested in assessing earthquake hazards for off-shore oil production. For more information on the SEISNOR network see J. Havskov *et al.*, 1992. The closest SEISNOR station to the Steigen area is LOF, Lofoton Islands, at a distance of 72 km from the average of the epicenters (shown in Figure 12). Waveforms from the SEISNOR network are not part of the GTDB.

All Steigen events are recorded at the IMS regional array, ARCESS and many were also recorded at NORESS and FINESA. No detections for these events were observed at GERESS, so the waveforms were excluded in the GTDB. (GERESS waveforms in the appropriate time window may exist at CSS).

Geologic/Tectonic Setting

Events in Dataset #2 and all observing stations in GTDB are on the Baltic shield. For a detailed summary of the geologic setting of the Steigen area see Atakan *et al.*, 1993.

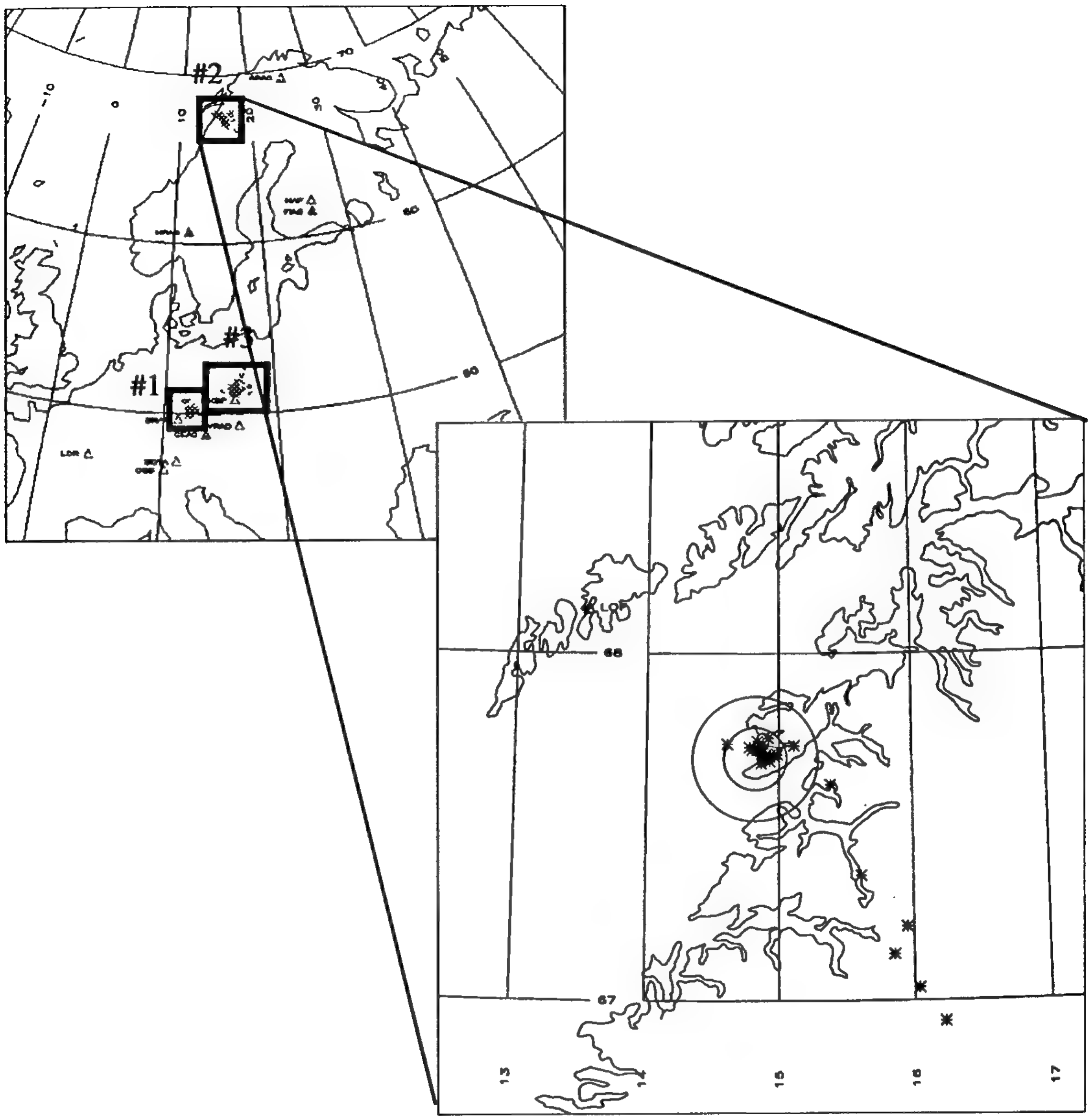

Figure 12: Dataset #2: Steigen. The nearest station contributing to the Bergen bulletin solutions is LOF. Events occur within a 10 km area centered on Brennvika Bay (Atakan *et al.*, 1993), smaller circle. The large circle, 20 km, radius, shows the area where most of the larger earthquakes were felt. Events located outside the circles are smaller events, not listed in the Bergen bulletin but still associated with the swarm.

The Steigen earthquake swarm is on the Norwegian Continental Shelf in a coastal zone between 65 and 67 latitude that is particularly notable for intra-plate earthquake activity (Bungum *et al.*, 1991).

Historical seismicity

Meløy, about 110 km down the coast from the Steigen events, was the site of an earthquake swarm which began in November of 1978. This swarm produced 10,000 events in the first ten weeks, the largest event with magnitude (ml) 3.2. Bungum *et al.*, 1979 report the results of analysis based on data from seven temporary stations set up in the area soon after the beginning of the sequence: epicenters are confined to a small area roughly ten km by eight km, centered on 66.81 N and 16.63 E; computed depths are between three and nine km; the composite focal mechanism indicates normal faulting on a plane striking N25E and dipping 63 E; most events with ml > 2.0 were felt within a 50 km radius based on questionnaires distributed in local newspapers.

The largest historical earthquake in the area occurred in 1819 at the town of Lurøy, about 150 km down the coast from the Steigen events (66.4 N, 14.4 E) with an estimated Ms magnitude of 5.8.

Pending additional information

A temporary network of portable seismic instruments was installed through a cooperative effort between the University of Bergen, Institute of Solid Earth Physics, and the Norwegian Seismic Array (NORSAR) to monitor the Steigen swarm. The four temporary stations where operating between 9 January 1992 and 16 January 1992. One of these temporary stations continues to operate from its current location in the basement of the municipality building in Leinesfjord within five km of the epicenters. The final manuscript (Atakan *et. al*, 1993) summarizes the results of analysis of the temporary network and includes focal plane solutions for some of the earthquakes. As of 31 December 1992 the swarm had generated at least 207 earthquakes. The report lists 13 events in 1992 with coda magnitudes of 3.0 or larger, six of which are included in the GTDB. In a separate communication, Mr. Atakan has provided a list of 87 events with revised locations which will be used to update locations listed in the GTDB.

The largest two events were detected by YKA array in Canada (Events 28 and 38). The Canadian data will be included in the GTDB when it becomes available.

Ground-Truth Information for Dataset #2: Steigen

The majority of the information for Dataset #2 is from the Bergen bulletin, as summarized in Table 18.

Table 17: *Ground-Truth Information for Dataset #2: Steigen*, Events 28-63

attribute	relation	ground-truth	contributor
etype	**origin**	Seven events were reported as felt earthquakes by the Helsinki bulletin (etype = **eq++**). All other events have etype = **eq+**, indicating they are a part of a swarm (Kværna, Hokland, pers. comm.)	(Kværna, Hokland, pers. comm.)
lat, lon	**origin**		Bergen bulletin
depth	**origin**	range 0-15.5 km (11 fixed at 12.1, 1 fixed at 1.5, others at 0)	Bergen bulletin
ml	**origin**	range 0.5 - 5.5	Bergen bulletin
origin time	**origin**		Bergen bulletin
exceptions		Events 29, 32, 34, 44, 62, 63 were not in the Bergen bulletin but were detected and located by the IMS as single-station solutions from ARCESS: For these 6 events, location solutions result from analysis at CSS.	

Bonus Events

Orids 315 and 271 are not part of the ground-truth database and are included only because their signals are recorded near signals from events 35 and 59 respectively. *Orid* 315 is located in Pakistan. The P arrival is approximately 73 seconds before the Pn arrival of Steigen Event 35 at ARCESS. *Orid* 271 is located in the Ionian Sea.

Table 18: Bonus Events, Dataset #2

orid	date	origin time	lat	lon	depth	mb	auth
315	01/04/92	03:35:22	31.954	69.991	29.00	5.0	USGS/ MON
271	01/25/92	12:23:18	38.277	20.266	10.00	4.2	USGS/ MON

Chapter 3: Dataset #3: Lubin

Event Type

31 induced mine tremors (*etype* = **qmt**)

Significance of this area

In the Lubin area, between 1980 and 1982, 232 tremors occurred with magnitudes above 1.5 (Gibowicz, 1985); between January of 1985 and March of 1986, 318 tremors occurred at Lubin with local magnitudes between 2 and 3.4 (Gibowicz, 1987). In addition to these frequent, small tremors, an occasional larger tremor occurs, such as the magnitude 4.5 tremor of March of 1977 (Gibowicz, 1984). See "GTDB Schema" on page 22 for discussion of the two types of mine tremors.

In addition to these events being significant because of their large frequency and size, they also provide an interesting source type: non-explosive source near the surface (depth less than one km). It is also noteworthy that many of these events with local magnitudes between 2.0 and 3.0 are registered by stations north of the Tornquist-Teisseyre tectonic zone (Gibowicz, 1987).

Because mine tremors and rockbursts are a great nuisance to underground mining operations and danger to miners, they are often monitored very closely by the mining companies with underground seismic networks located at the working level of the mine. Polish mining companies are legally responsible for keeping records of all events occurring in their area with energy level over 10^5 joules for two years.(10^5 joules is approximately equal to a local magnitude of 2.0, Gibowicz, 1985). However, the mining companies do not calculate precise origin times as they are mostly interested in size and location. Dr. Wiejacz, obtained the "ground-truth" for these events directly from the mining authorities.

Location

Events in Dataset #3 are in the Lubin Copper Basin in Poland, a very active mining region between the cities of Legnica and Glogow. In Poland, this district is called LGOM, an abbreviation of Legnicko-Glogowski Okreg Miedziowy. There are four active mines: Lubin, Polkowice, Rudna, and Sieroszowice occupying an area approximating an ellipse with the long axis running NW-SE, about 15 km long. The 31 events in Dataset #3 are plotted in Figure 13.

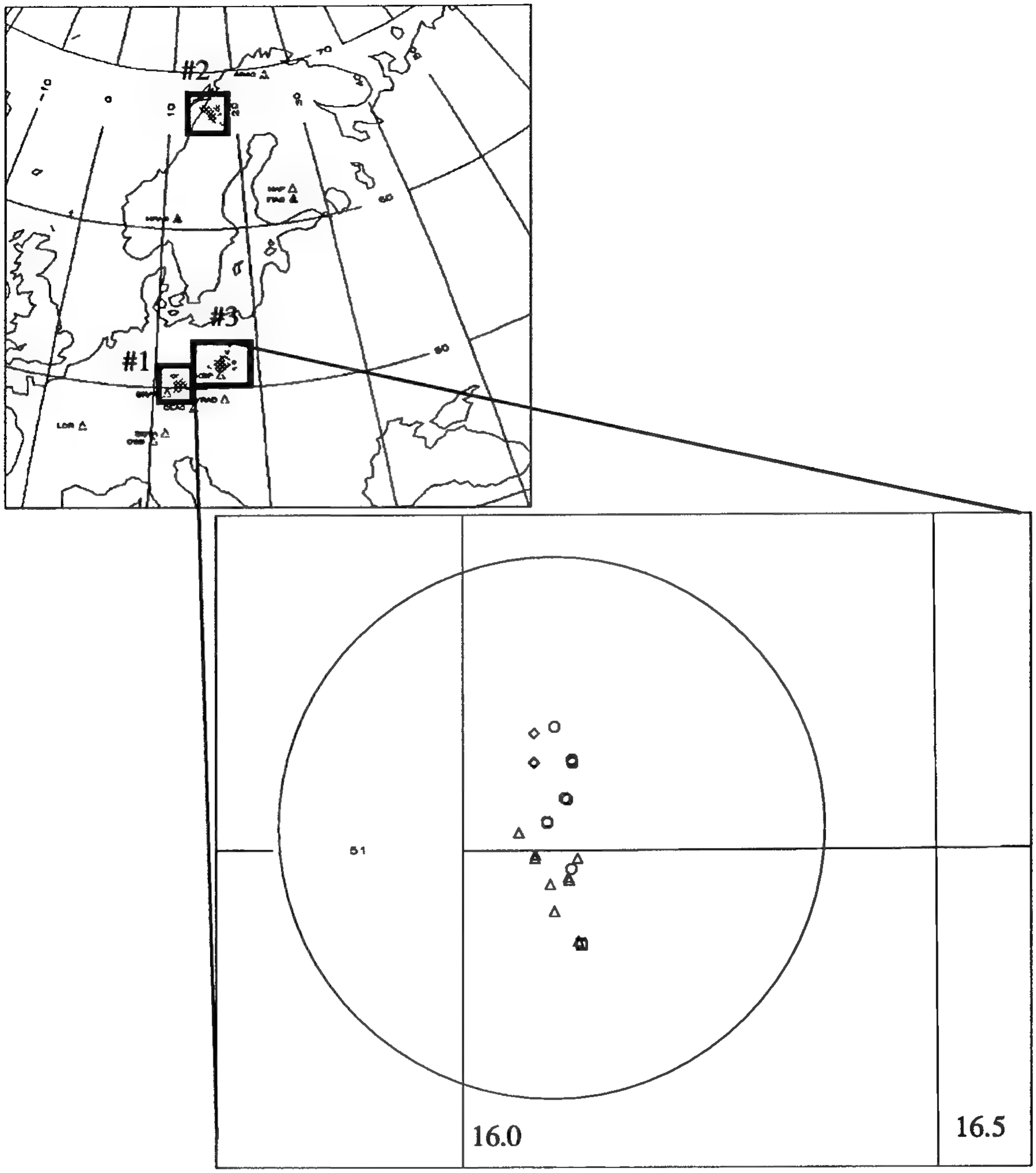

Figure 13: Dataset #3:Lubin. Circle is 20 km radius. Four different mines are represented by the symbols. The mining area about 15 km long, trending in the NW direction.

Depth

Mining is carried out at a single level between 600 and 1000 meters below the surface, depending on the mine. Surface elevation is between 200 and 250 meters in the area. Event depths provided by P. Wiejacz are either assumed or calculated. Calculated depths are based on recordings from seismic networks operated by the mine. Since all instruments for a particular mine are at a single level, the location estimates are poorer in the vertical direction than in the horizontal direction. In the absence of a calculated depth, the event is assumed to occur at the working level of the mine, which is known.

Observing stations

These events are well recorded at KSP, GERESS, NORESS, and sometimes FINESA and ARCESS. GSETT-2 stations include VRAC, GRA1, SQTA, and YKA.

YKA data collected during GSETT-2 for five of the Lubin events are shown in Figure 14. There is some evidence from the largest event that the initial P may be earlier than the time-arrival picks shown in this figure.

Historical seismicity

Seismic activity near the mines in Poland is well-documented as being directly linked to mining activity (Gibowicz, 1984). Tectonic stresses are altered by the extraction of tens of millions of tons of coal and iron ore per year.

Contributors

P. Wiejacz, H.-P. Harjes, S. J. Gibowicz

Outstanding problems

Mine tremors in the Lubin mines are sometimes triggered by intentional blasts set off for the purpose of releasing stress, thereby preventing the larger events. It is not clear whether these blasts should be detected at GERESS and even if they are, Gibowicz states "...these are not really "pure" blasts since they often provoke, under high stress concentration conditions, seismic events which are not necessarily proportional to blast charges" (Gibowicz, personal communication). These intentional blasts are usually set off between 0300 and 0400 hours (Schweitzer *et al.*, 1992), explaining the peak in the plot of hourly event rate shown in Figure15.

Ground-Truth Information for Dataset #3

Information about the events in Dataset #3 results from seismic networks operated by the mines (Wiejacz) and seismic analysis at CSS, as shown in Table 19.

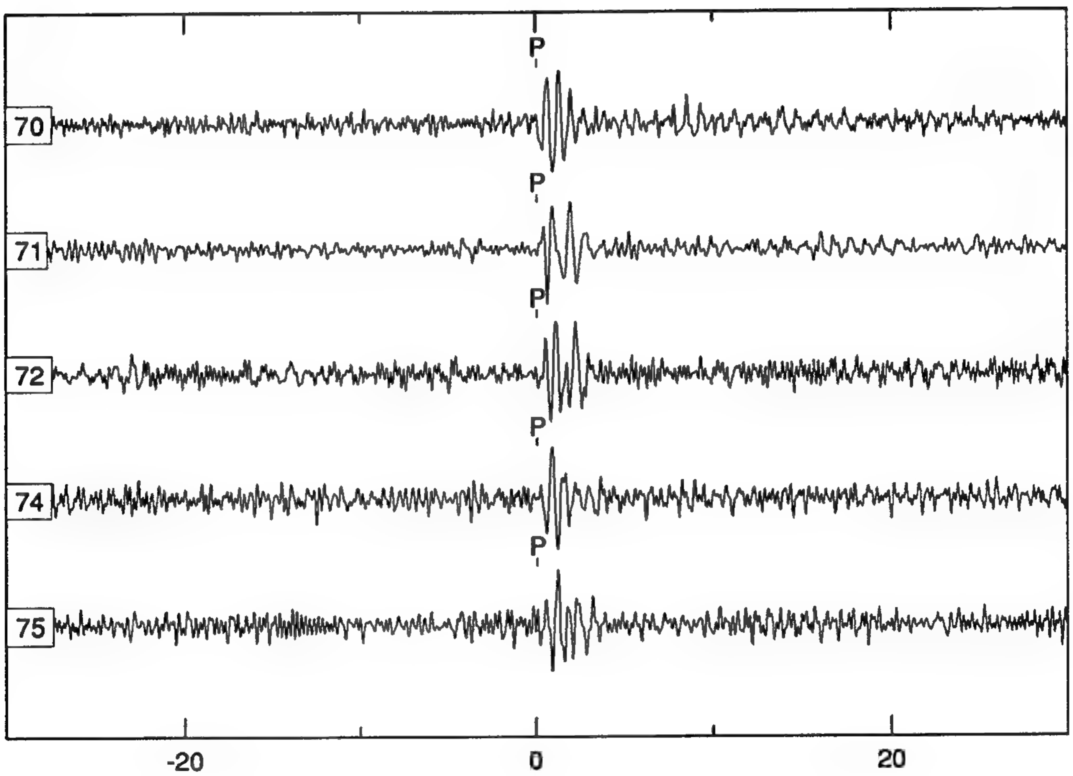

Figure 14: Five events from Dataset #3 Lubin, recorded at the Canadian array YKA (60 degrees). Traces are the coherent beam contributed by YKA during GSETT-2 and have been bandpass filtered 1 to 4 Hz. One minute of data is shown.

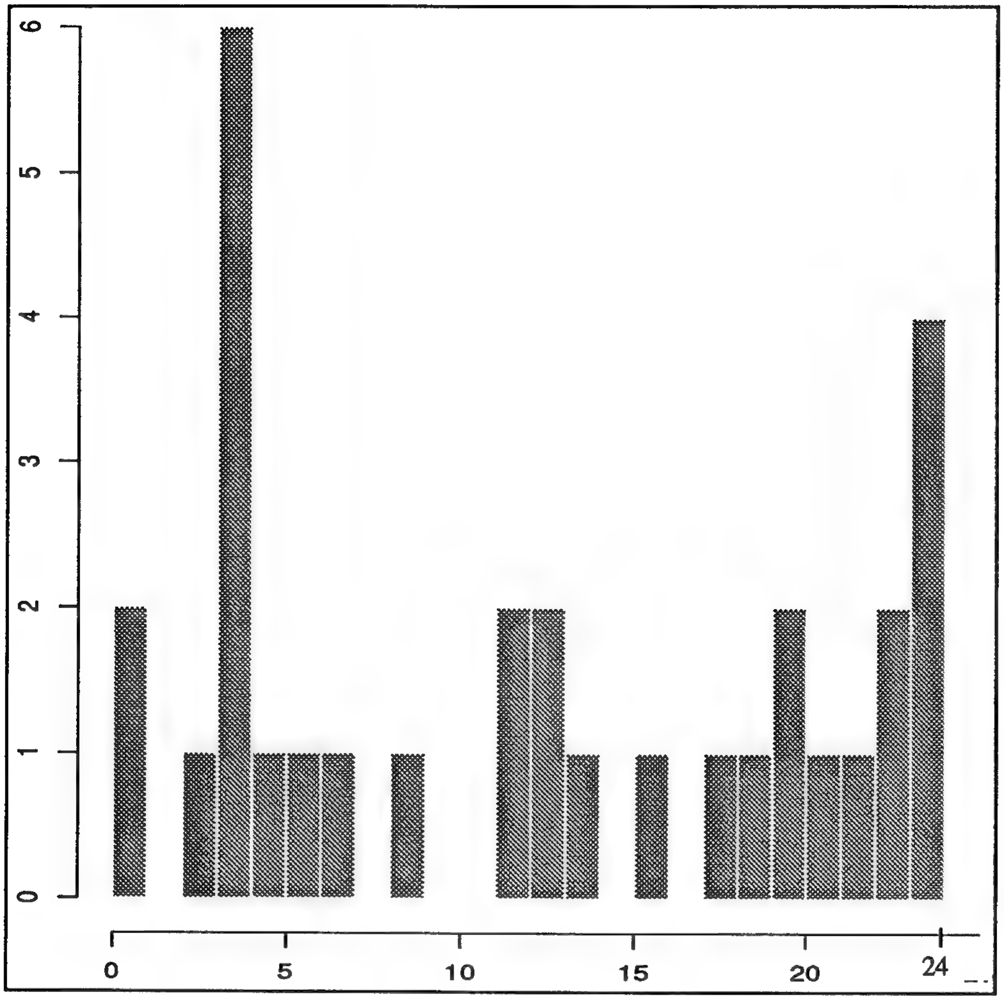

Figure 15: Time of day histogram for Dataset #3: Lubin events. The peak at 0300 hours is the time small blasts are set off to trigger the mine tremors. These blasts are also set off during shift changes so peaks could be expected at 0600, 1400, and 2200 hours local time.

Table 19: ***Ground-Truth Information for Dataset #3: Lubin, Events*** 65-95

attribute	relation	ground-truth	contributor
etype	**origin**	**qmt**	Wiejacz
lat, lon	**origin**	15 of the event locations are based on solutions from mining seismic network- error 20 meters. 16 of the event locations are determined by associating events with a known exploitation field and assigning the location based on the geographical center of the field- error 500 meters. The **notebook** table distinguishes between location type.	Wiejacz
depth	**origin**	Event depths are usually assumed to be at the working level of the mine, between 700 and 1150 meters below the surface, depending on the mine.	Wiejacz
ml	**origin**		from seismic analysis at CSS
time	**origin**		from seismic analysis at CSS
minam	**minfo**	Sieroszowice (6 events from 1 drift), Rudna (10 events from 6 drifts), Polkowice (13 events from 8 drifts), Lubin (2 events from 1 drifts)	Wiejacz
note	**notebook**	In addition to the mine name, the area within the mine (west, center, east), field number, and longwall number are known for each event. However, maps from the mine to interpret the field and longwall numbers are not available.	Wiejacz
note	**notebook**	distinguishes between horizontal location type: either assumed or calculated by mining seismic networks.	Wiejacz
note	**notebook**	Event 76 was triggered by an intentional blast. This is noted in the **notebook** Table.	Wiejacz

PART 3: EVENT PLOTS

Event Plots have four main components: Location and Phase information, Map, Datamatrix and Sample waveform data. As an illustration of the components of the event plots, Event 72 of Dataset #3 is shown in Figure 16.

A: Title, location and phase information

1. Dataset number, event number (*evid*)

2. Location information. All attributes are from the "hybrid" **origin** table unless otherwise noted. Columns are:

Jdate	Julian day
Date	Month, day, year
Time	Origin time. hour:minute:second.decimal seconds
Lat	geographical coordinates
Lon	geographical coordinates
Depth	kilometers
Smajor	length major axis of error ellipse, km (ORIGERR Table)
Sminor	length major axis of error ellipse, km (ORIGERR Table)
Strike	strike of error ellipse, degrees (ORIGERR Table)
Mb	body wave magnitude
Ml	local magnitude
Etype	Event type
Orid	Origin identification number (id).
Auth	Author

3. Recording station information. One line is shown for each recording station. Information is from the **assoc** table.

Delta	station to event distance, degrees
Azimuth	station to event azimuth, degrees
Backazimuth	event to station azimuth

4. Phase information. One line is displayed for each associated arrival. Information from the **arrival** table unless otherwise noted.

Phase	final analyst phase id (**assoc** Table)
Iphase	Initial Phase id
Time	final analyst time
Azimuth	azimuth estimate, degrees (from FK analysis for IMS)
Slowness	slowness estimate, sec/degree (from FK analysis for IMS)

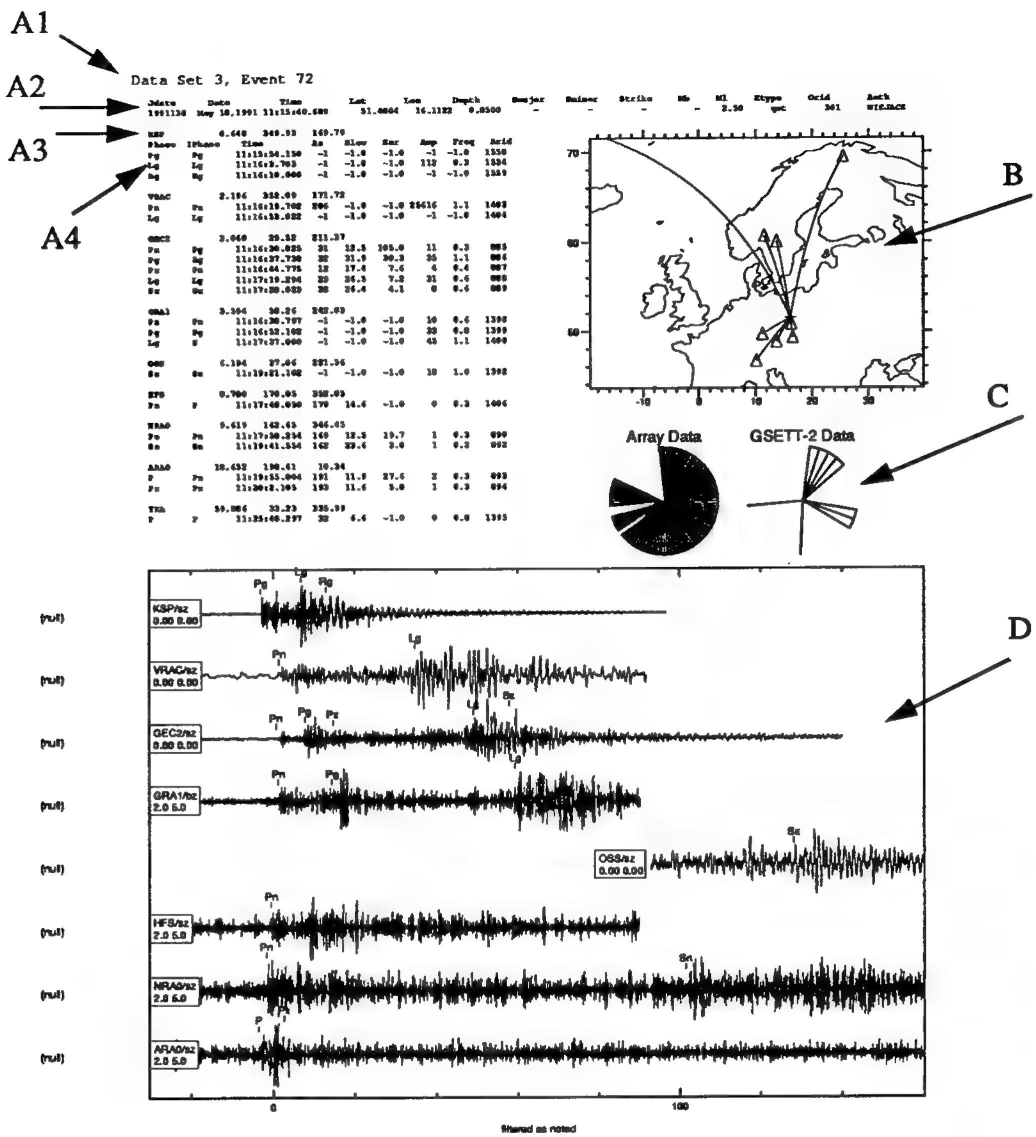

Figure 16: Example event plot for Dataset #3, Event 72 showing the four main components. A) Title, location and phase information. B) Map showing event location (plus) and recording stations (triangles) C) Datamatrices- giving a qualitative summary of available waveform data D) Waveform plot showing representative waveforms. See text for additional details.

Snr	Signal to noise ration
Amp	amplitude
Freq	frequency
Arid	arrival id

B. Event Map

Crosses show event location. Triangles show the stations with at least one associated phase.

C. Datamatrix

The datamatrix "quick-look" visualization tool allows comparison of the relative number of data channels available for each event. The datamatrices look like a wagon wheel with each spoke representing a channel of waveform data. If all possible channels are available for a given event, then each spoke is present and the wheel is round. If a data channel is missing, then the spoke is not displayed and the gaps in the wheel create a pattern that is easy to compare from event to event.

The data matrices have been divided into IMS2 data (132 channels of IMS2) and GSETT-2 data (35 channels of GSETT-2 data). There is some overlap between the two datamatrices. For example, KSP data exists for some events because it was part of GSETT-2 and it exists for some events because it was temporarily part of IMS2. The reference datamatrix for array data is shown in Figure 17. The full complement of array data from the IMS2 database, not including any long-period or intermediate-period channels is 132 channels, as summarized in Table 20. The reference data matrix for GSETT-2 data is

Table 20: Array Channels

	number of channels									
array	*sz*	*sn*	*se*	*bz*	*bn*	*be*	*cb*	*ib*	*hb*	total
ARCESS	25	4	4	0	0	0	1	1	1	36
NORESS	25	4	4	0	0	0	1	1	1	36
FINESA	16	1	1	0	0	0	1	1	1	21
GERESS	25	4	4	1	1	1	1	1	1	39

shown in Figure 18. It includes 35 channels from GSETT-2. Only Dataset #1:(Vogtland) and Dataset #3: (Lubin) have GSETT-2 data. Stations GAR, TLY, OBN, KIV and MAT have available data from only one or two events each and have no associated arrivals.

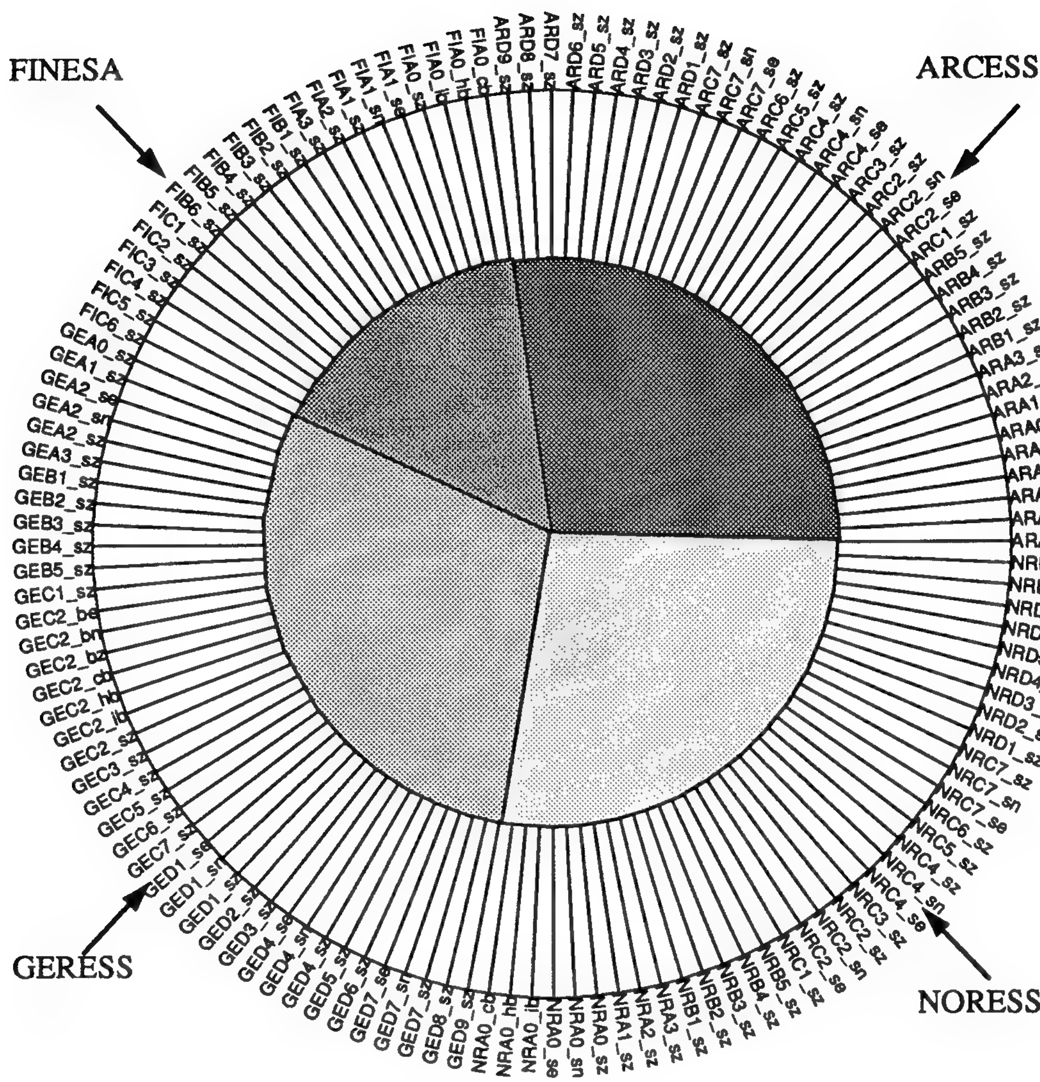

Figure 17: Reference data matrix for the four regional IMS2 arrays. The full set of array data is 132 channels including display beams.

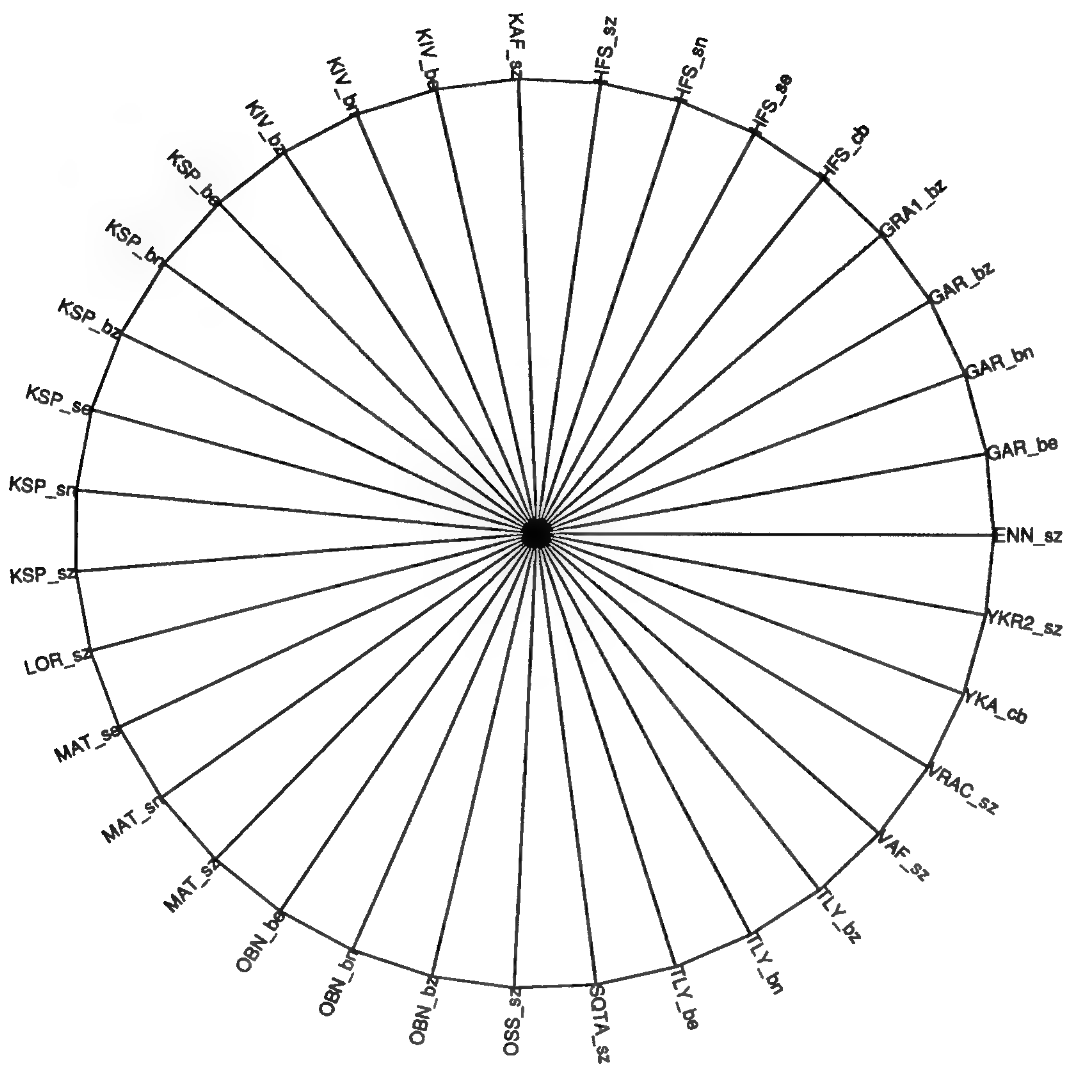

Figure 18: Reference data matrix for the GSETT-2 stations.

For the example shown in Figure 16, the gap in the datamatrix for the array data indicates that the FINESA data is not available for this event and several channels of GERESS data are also missing. The datamatrix on the right indicates the availability of 10 channels of GSETT-2 data.

D. Sample of waveform data

The waveform plots do not necessarily show all the available data for each event. These are shown only to give a qualitative indication of the signal to noise ratio, and length of the data segments. Within each dataset there is a maximum number of traces to show, which are filled by priority.

The waveform plots where made with the *geotool* program (Henson and Coyne, 1993). The traces are aligned on Pn (at 0 time), sorted by distance, uniformly scaled to the peak of each trace; 150 seconds shown. Although the preference was for showing all data unfiltered, some traces were bandpass filtered, as noted at the bottom of the plot. The filter corners are given on the trace labels. The phase labels are from the **assoc** table and are the final analyst phase identifications. The phase times are from the **arrival** table and are the final analyst phase time picks. In the example shown in Figure 16, the waveform segment for station OSS starts after the first arrival and the waveform segment for HFS terminates before the Lg arrival.

Acknowledgments

As mentioned in the preface of this document, this database would not have been possible without the contributions of the local experts listed in Part 1, Chapter 3.0. Many other researchers contributed indirectly to the acquisition of ground-truth by helping us establish contacts with the local experts. These include Tom Sereno, Tormod Kvaerna, Svein Mykkeltveit, Bernt Hokland, Hans-Peter Harjes and Alan Ryall. We also acknowledge helpful discussions with the Center's Research Staff in planning and developing this database. This document was improved by editorial contributions of Carl Romney.

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Electronic Mail Distribution List

Announcements of new datasets are made in the newsgroup *seismic.general*. When the announcements are made, they are also sent via e-mail to the following. If you would like to be added to or subtracted from the e-mailing list please notify Lori Grant or John Coyne (grant@seismo.css.gov or coyne@seismo.css.gov).

bennett@beno.css.gov
cercone@sol.CSS.GOV
bernt@elg.norsar.no
clifft@ geology.wisc.edu
dainty@doc.plh.af.mil
doug@beno.css.gov
firbas@arwen.ics.muni.cs
fisk@sol.css.gov
gupta@beno.css.gov
lacoss@xn.ll.mit.edu
marshall@beno.css.gov
maxion@k.gp.cs.cmu.edu
pulli@beno.CSS.GOV
rrb@beno.CSS.GOV
ryall@darpa.mil
stump@lust.isem.smu.edu
sue@xn.ll.mit.edu
tjs@esosun.CSS.GOV
tormod@elg.norsar.no
wahl@esosun.CSS.GOV
wallace@coda.geo.arizona.edu
derza@beno

Form for submitting new datasets/comments
CSS Ground-Truth Database

TO:

Lori Grant or John Coyne
Center For Seismic Studies
1300 North 17th Street, Suite 1450
Arlington, VA 22209
703-276-7900
grant@seismo.css.gov, coyne@seismo.css.gov

FROM:

<u>The following ground-truth data should be included in the GTDB!</u>

Years:

Event types:

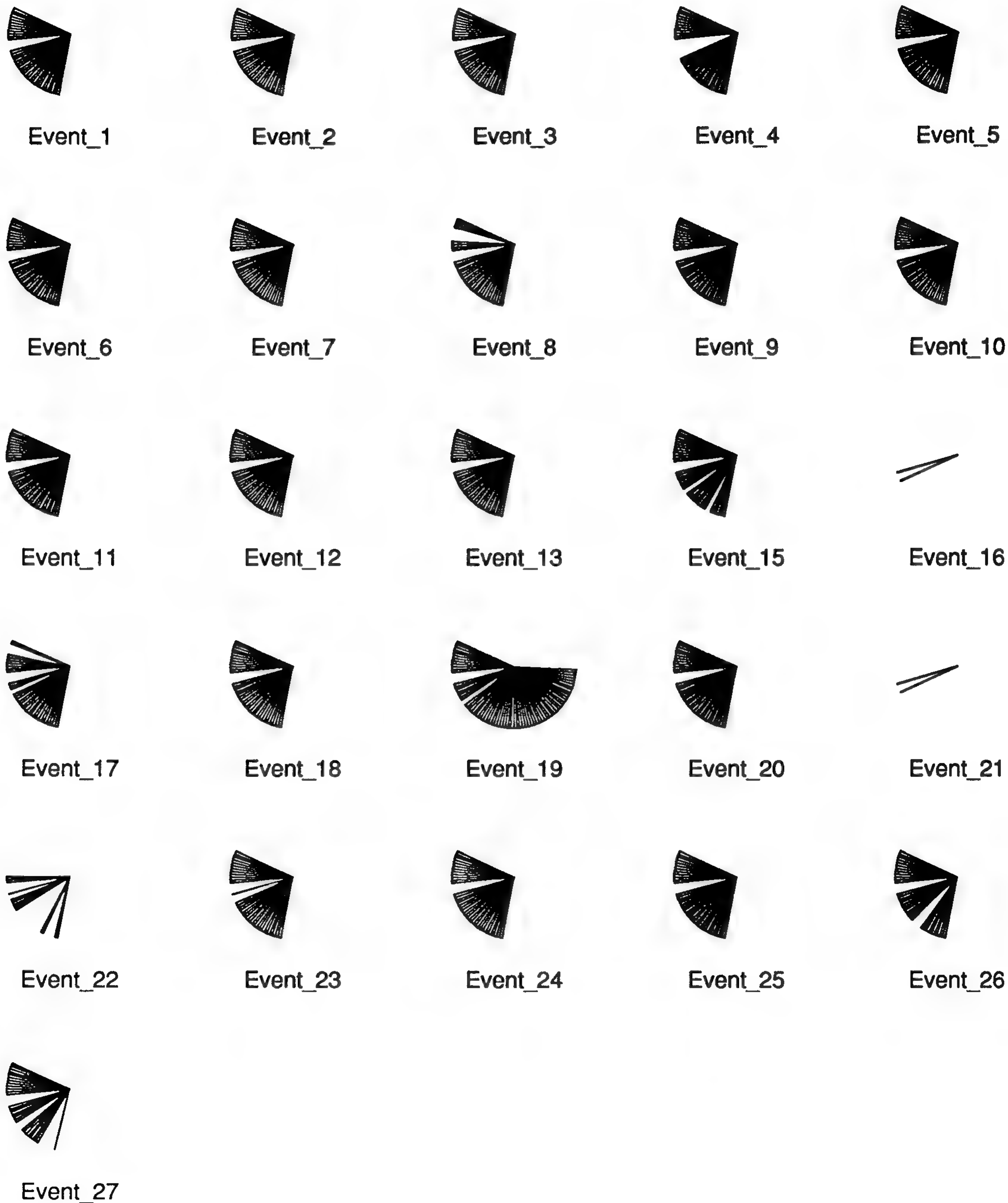
Source and type of ground-truth information:

Recording network:

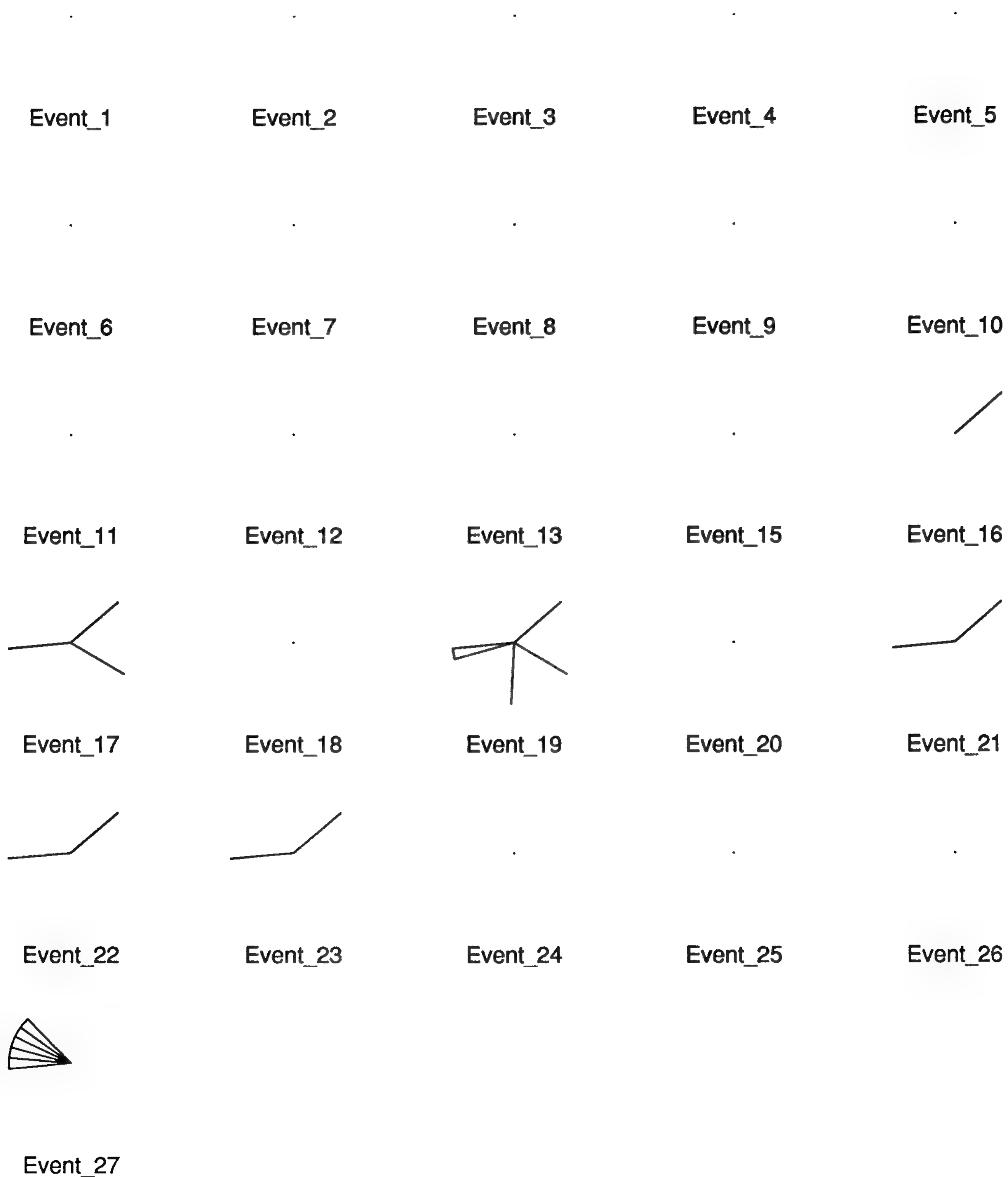
<u>Contact person for this data:</u>
Name:
Address:
Phone:
e-mail:

<u>Other suggestions for the ground-truth database</u>

Data Set #1 VOGTLAND: Array Data



Data Set #1 VOGTLAND: GSETT-2 Data



Event Number	Dataset Name	Event Type
1	#1: VOGTLAND	qb

attribute	Ground Truth	refid
etype	Probable blast, Vintirov open pit coal mine	501
lat,lon	Vintirov, minid=1363	501
depth	0	501
totcha	3256 kg	501

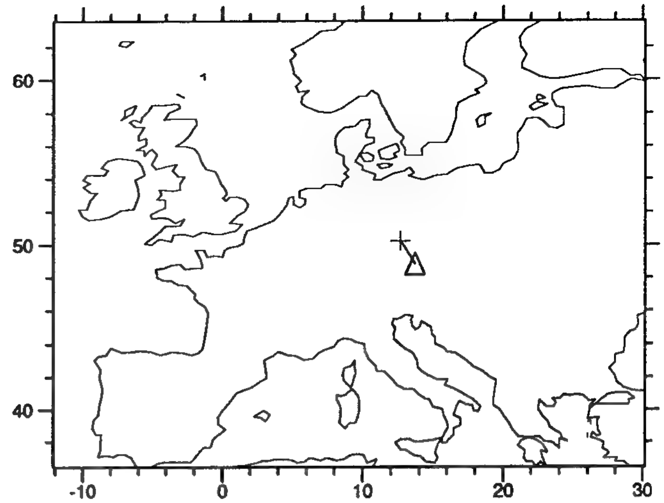
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501
	Double event, not mixed. Bonus event, orid 210 in origin table. Event 1 is the second event. The first arrival of the bonus event starts approximately one minute before event 1.	-999

Data Set 1, Event 1

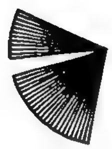
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991070	Mar 11,1991	12:03:23.986	50.2070	12.6850	0.0000	-	-	-	-	1.98	qb	100	FIRBAS

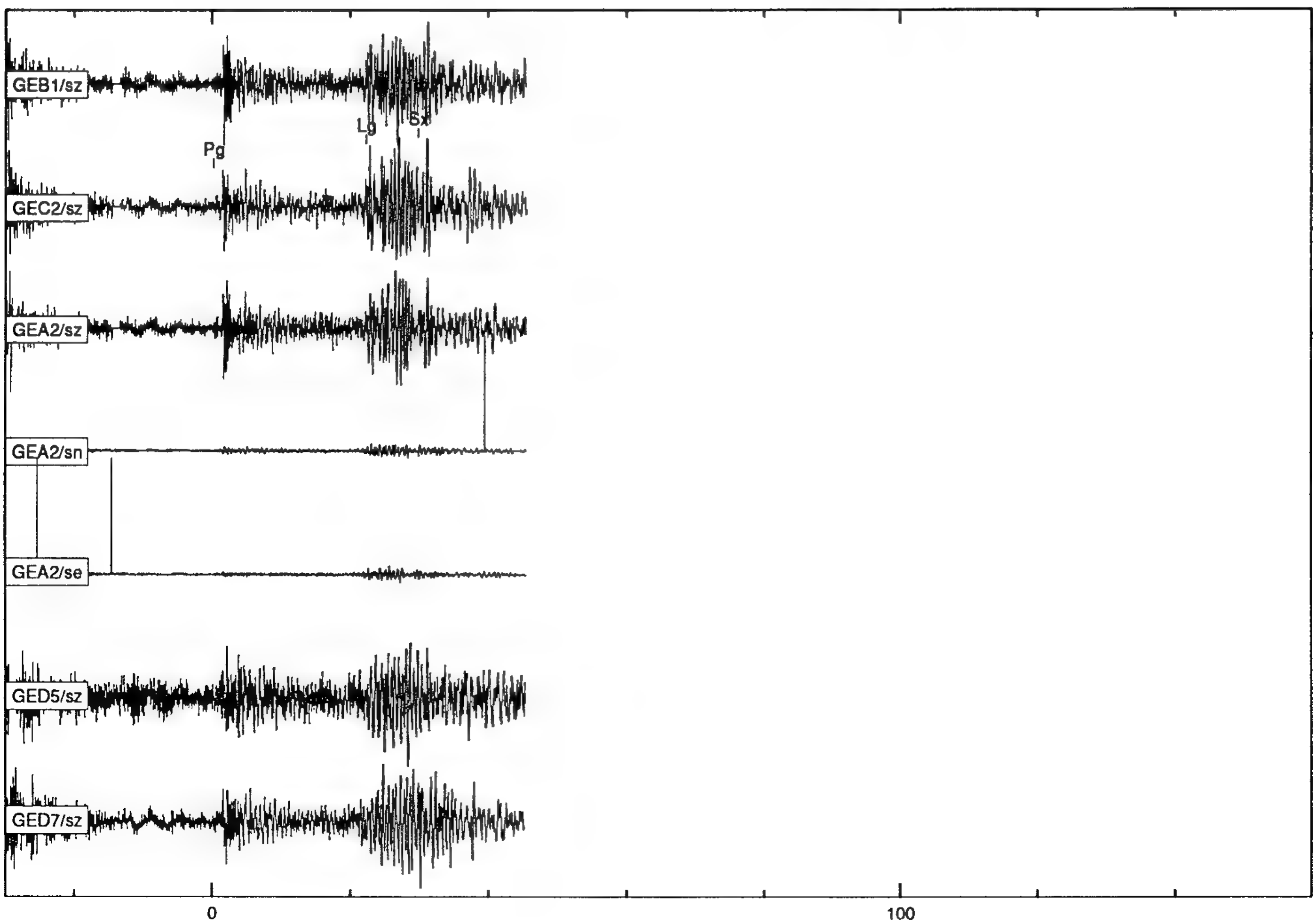
GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	12:03:52.461	336	14.5	10.8	7	0.3	5
Lg	Lg	12:04:14.604	324	41.2	8.5	22	0.5	6
Sx	Lg	12:04:22.175	314	39.3	4.2	24	0.7	7



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
2	#1: VOGTLAND	qb

attribute	Ground Truth	refid
etype	Probable blast	501
lat,lon	Vintirov, minid=1363	501
depth	0	501
totacha	3982 kg	501

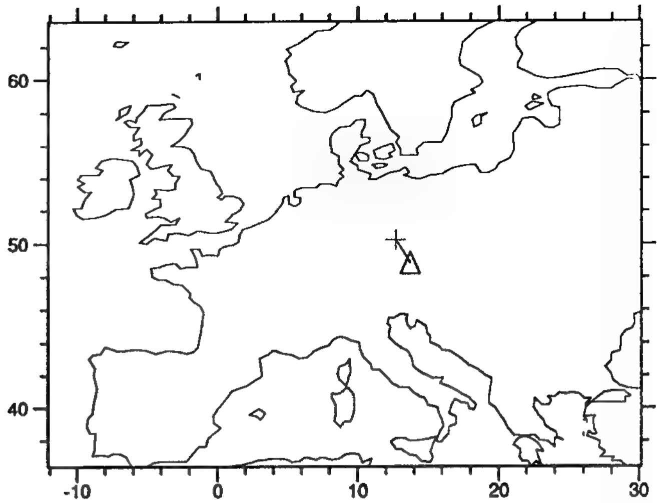
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
	Event preceeding this one by about 3 minutes not saved in *origin* table	-999
	also referenced by Gestermann *et al.* 1992	231

Data Set 1, Event 2

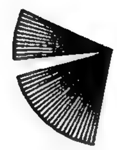
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991080	Mar 21,1991	12:04:14.701	50.2070	12.6850	0.0000	-	-	-	-	2.05	qb	101	FIRBAS

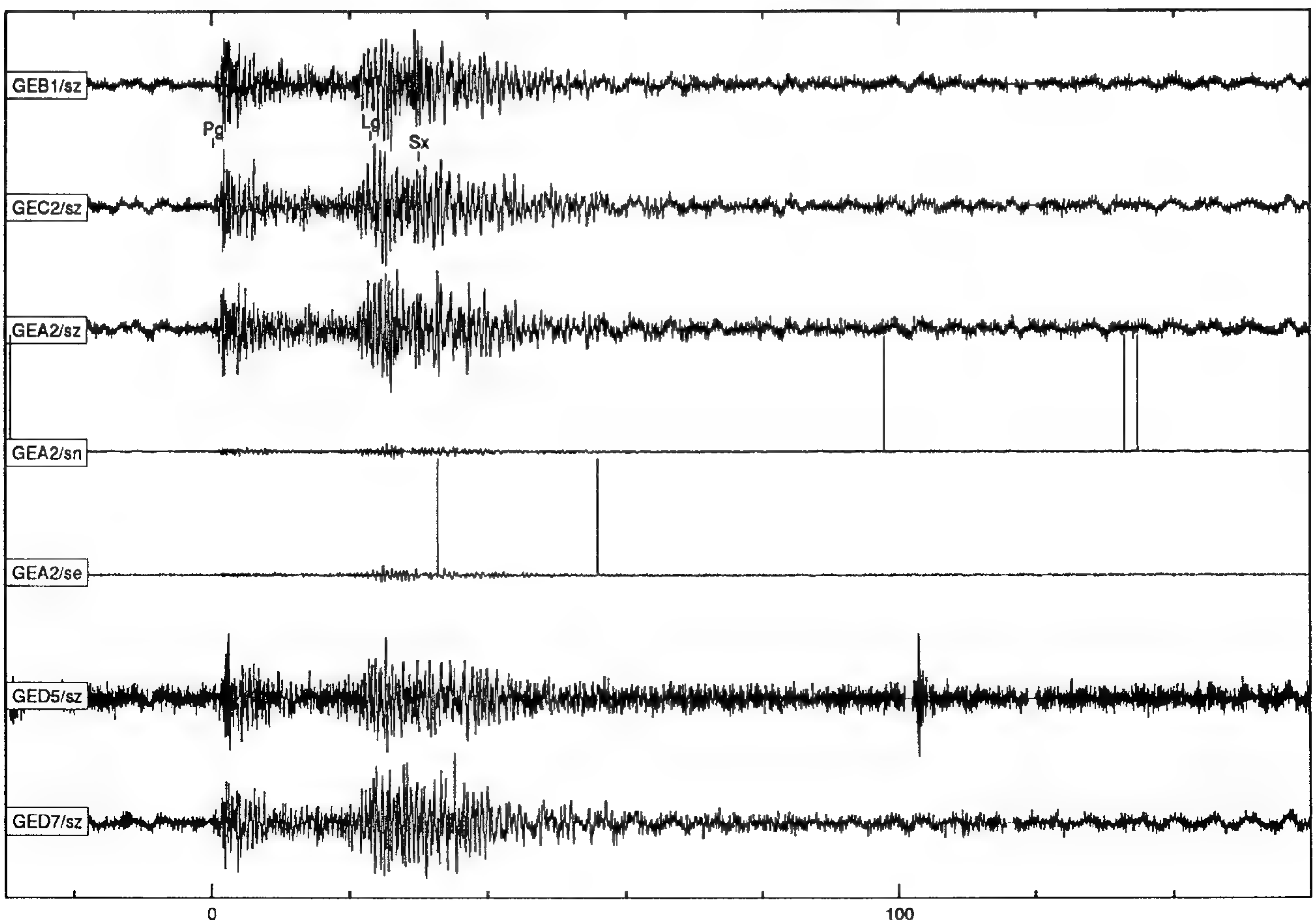
GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	12:04:43.175	335	14.4	36.3	8	0.3	26
Lg	Rg	12:05:6.045	329	33.2	7.5	25	0.8	27
Sx	Lg	12:05:13.075	324	31.1	3.4	18	0.5	28



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
3	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov, minid=1363	501
depth	0	501
totcha	2835 kg	501

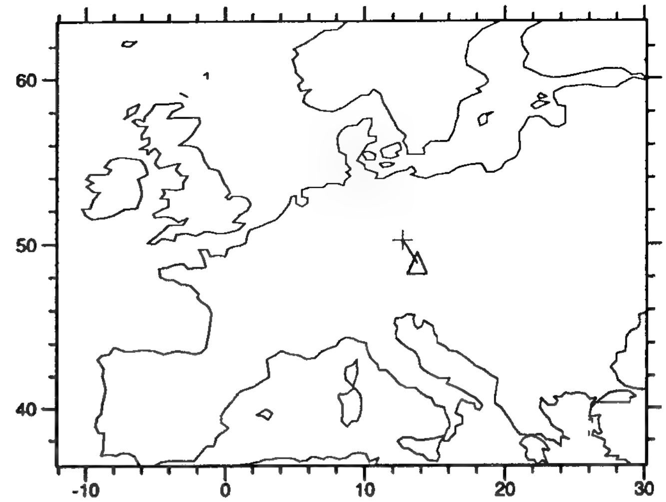
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 3

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991081	Mar 22,1991	12:33:25.332	50.2070	12.6850	0.0000	-	-	-	-	2.03	qb	102	FIRBAS

GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	12:33:53.806	337	15.1	22.6	4	0.3	39
Px	Px	12:34:0.775	337	16.1	5.6	1	0.4	40
Lg	Lg	12:34:17.861	336	26.9	11.2	6	0.5	41
Sx	Sx	12:34:21.500	322	35.9	5.7	20	0.5	38



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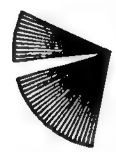
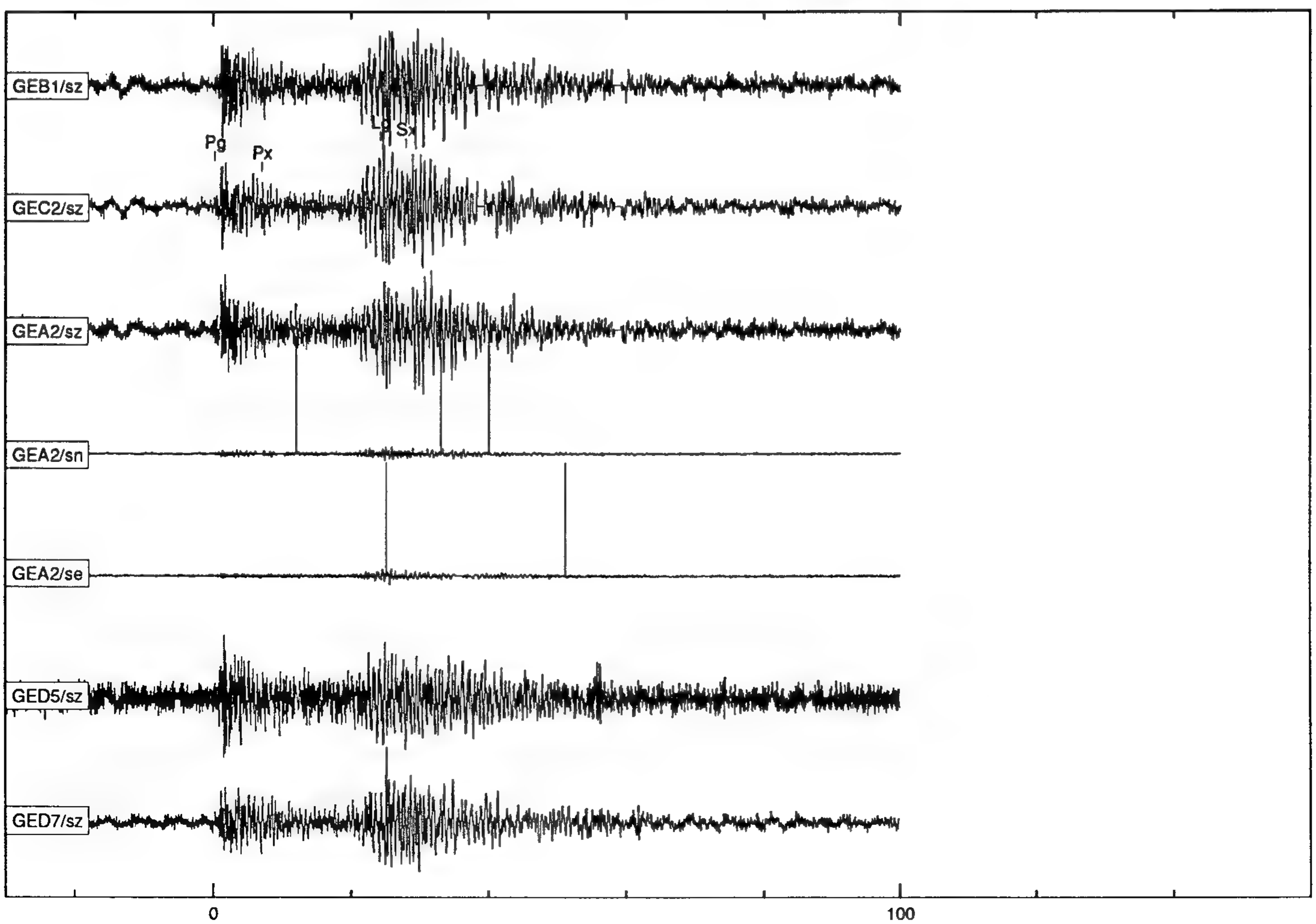




unfiltered

Event Number	Dataset Name	Event Type
4	#1: VOGTLAND	qb

attribute	Ground Truth	refid
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov, minid=1363	501
depth	0	501
totcha	2025 kg	501

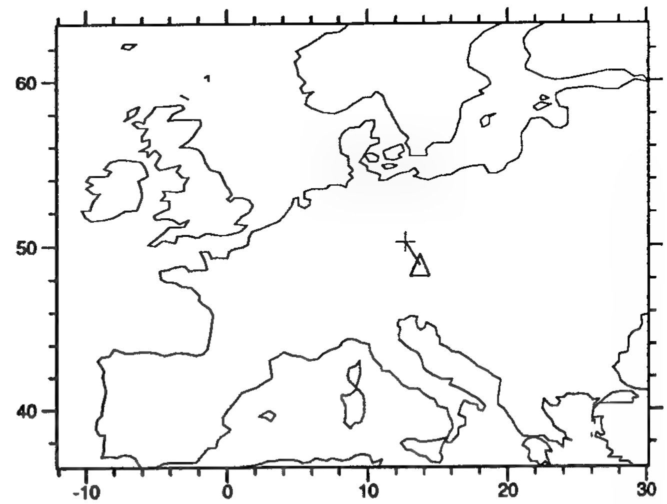
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501
	Double event, not mixed. Event 4 is the first of the two. Other event not saved in *origin* table.	-999
	GEC2/sz has data droput at first arrival; picking difficult to do with consistency	-999

Data Set 1, Event 4

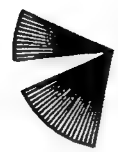
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991082	Mar 23,1991	12:00:55.800	50.2070	12.6850	0.0000	-	-	-	-	1.99	qb	103	FIRBAS

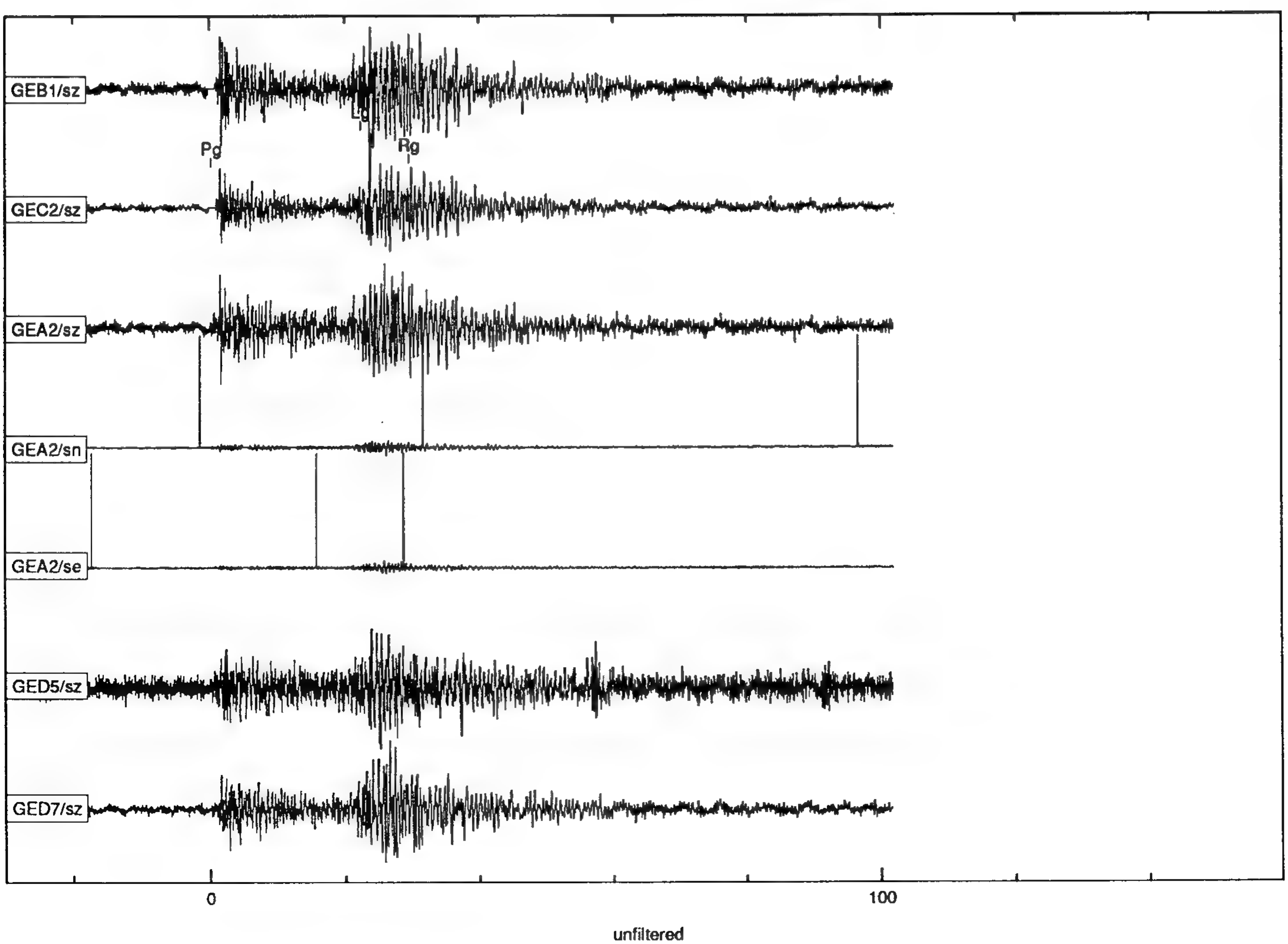
GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	12:01:24.275	336	13.9	43.3	8	0.3	62
Lg	Lg	12:01:46.484	328	30.6	7.0	11	0.3	63
Rg	Sx	12:01:53.600	334	26.8	3.9	14	0.5	57



Array Data GSETT-2 Data





Event Number	Dataset Name	Event Type
5	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

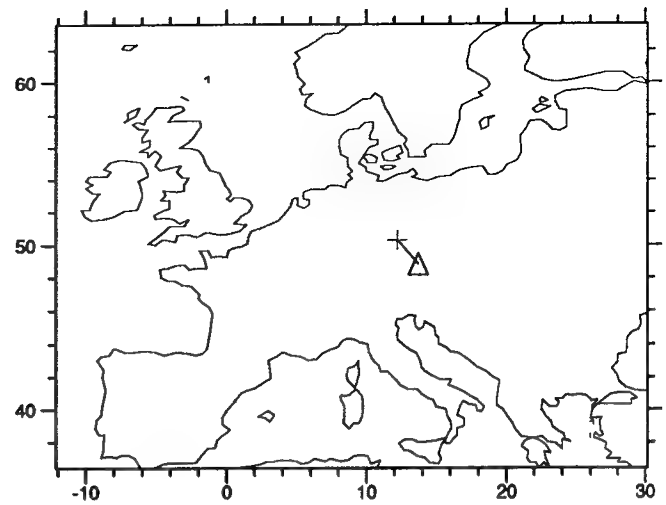
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209
7	locations good to + - 1 km due to dense network,-Schmedes, pers.comm.	209

Data Set 1, Event 5

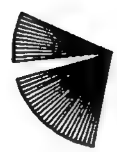
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	5:05:4.447	50.2960	12.2250	12.9000	-	-	-	-	2.18	eq+	104	NEUNHOFER

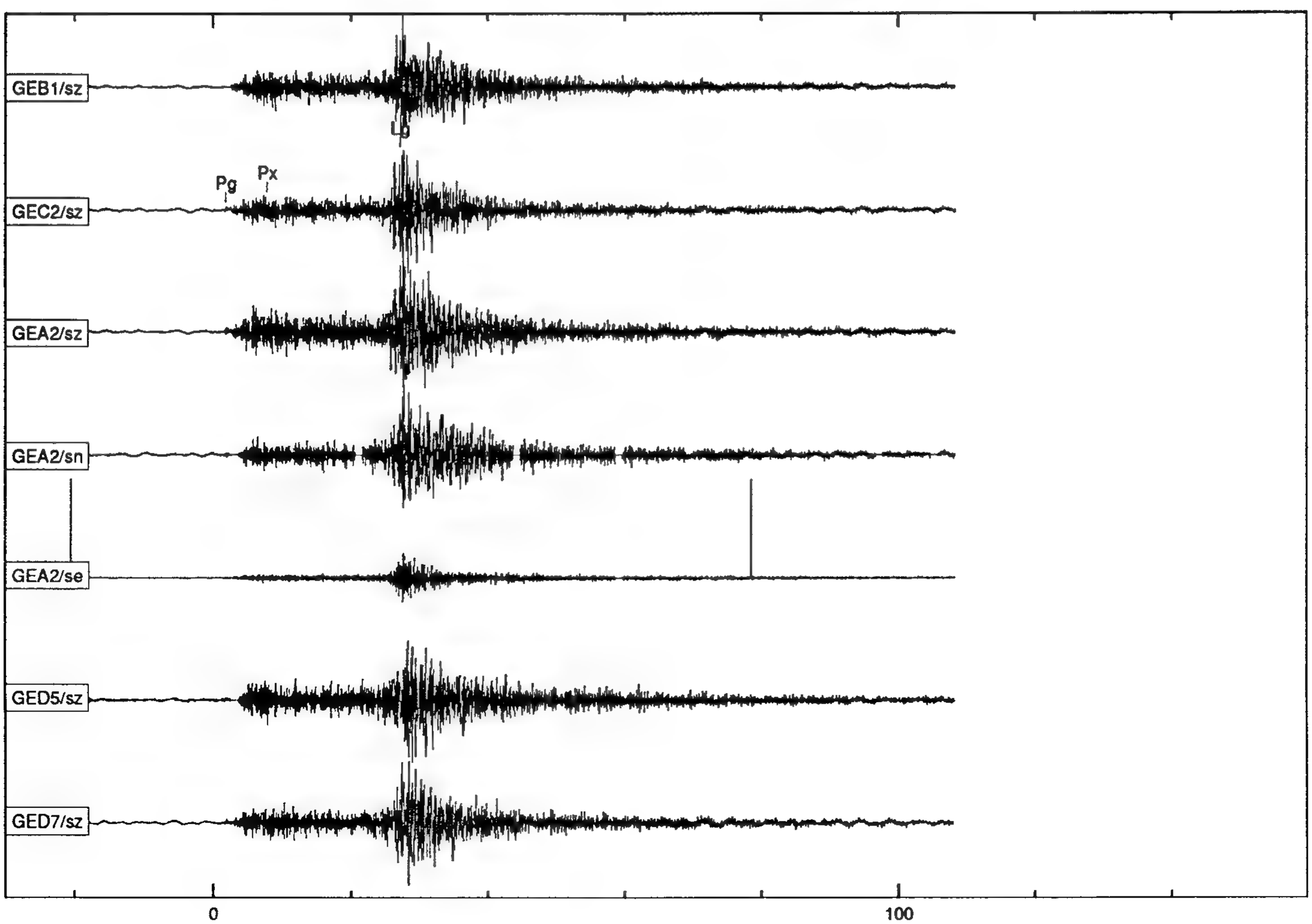
GEC2 1.742 327.06 145.34

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	5:05:36.153	323	12.0	56.6	3	0.3	85
Px	Px	5:05:42.075	326	14.4	11.1	1	0.3	86
Lg	Lg	5:06:1.497	325	27.7	28.1	7	0.3	87



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
6	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

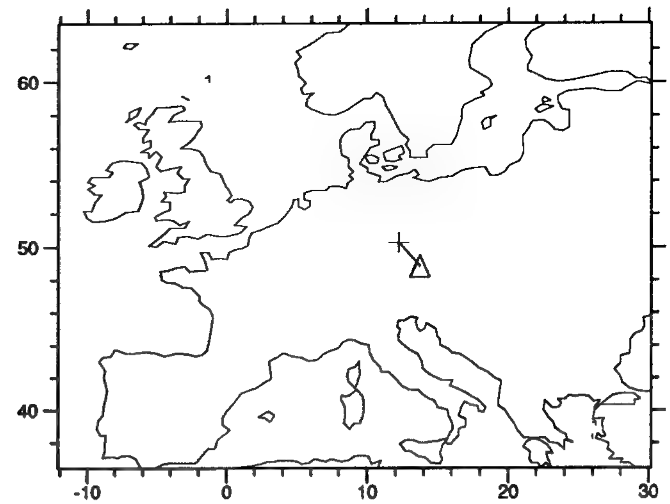
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209
7	locations good to + - 1 km due to dense network,-Schmedes, pers.comm.a	209
	small event, difficult to time arrivals	-999

Data Set 1, Event 6

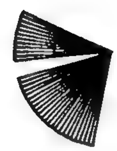
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	5:35:21.047	50.2790	12.2280	12.9000	-	-	-	-	1.50	eq+	105	NEUNHOFER

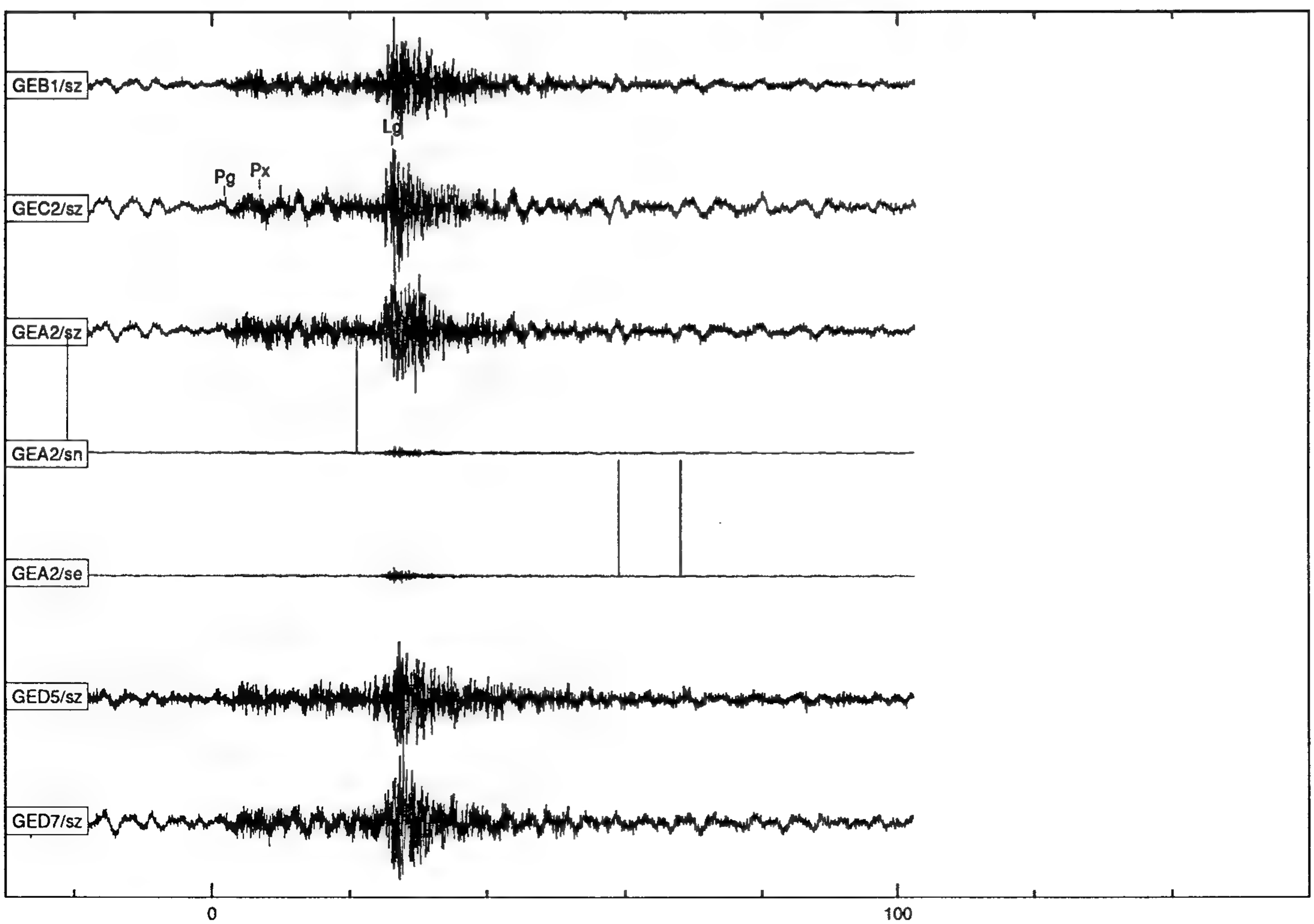
GEC2 1.727 326.79 145.68

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	5:35:52.536	-1	-1.0	-1.0	-1	-1.0	1463
Px	Pg	5:35:57.586	325	14.7	8.0	0	0.3	82
Lg	Lg	5:36:16.749	325	28.8	13.2	3	0.2	83



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
7	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

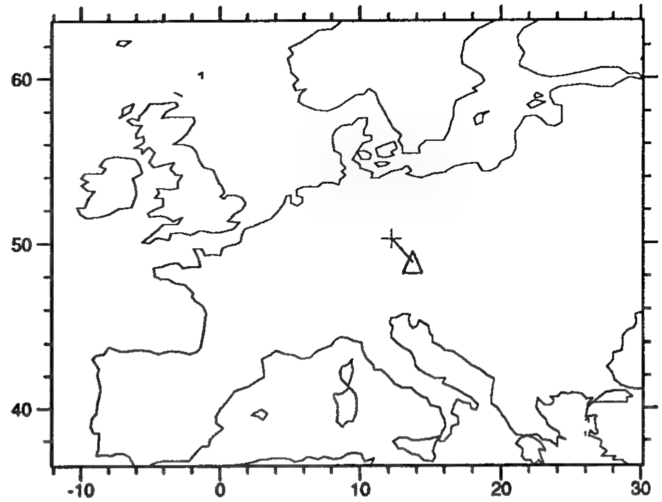
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209
7	locations good to + - 1 km due to dense network,-Schmedes, pers.comm.a	209
10	Teleseismic P arrival in Lg coda corresponds to bonus event, orid 126 in *origin* table	-999

Data Set 1, Event 7

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	6:57:59.309	50.2770	12.2400	13.9000	-	-	-	-	1.40	eq+	106	NEUNHOFER

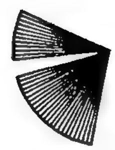
GEC2 1.721 326.97 145.86

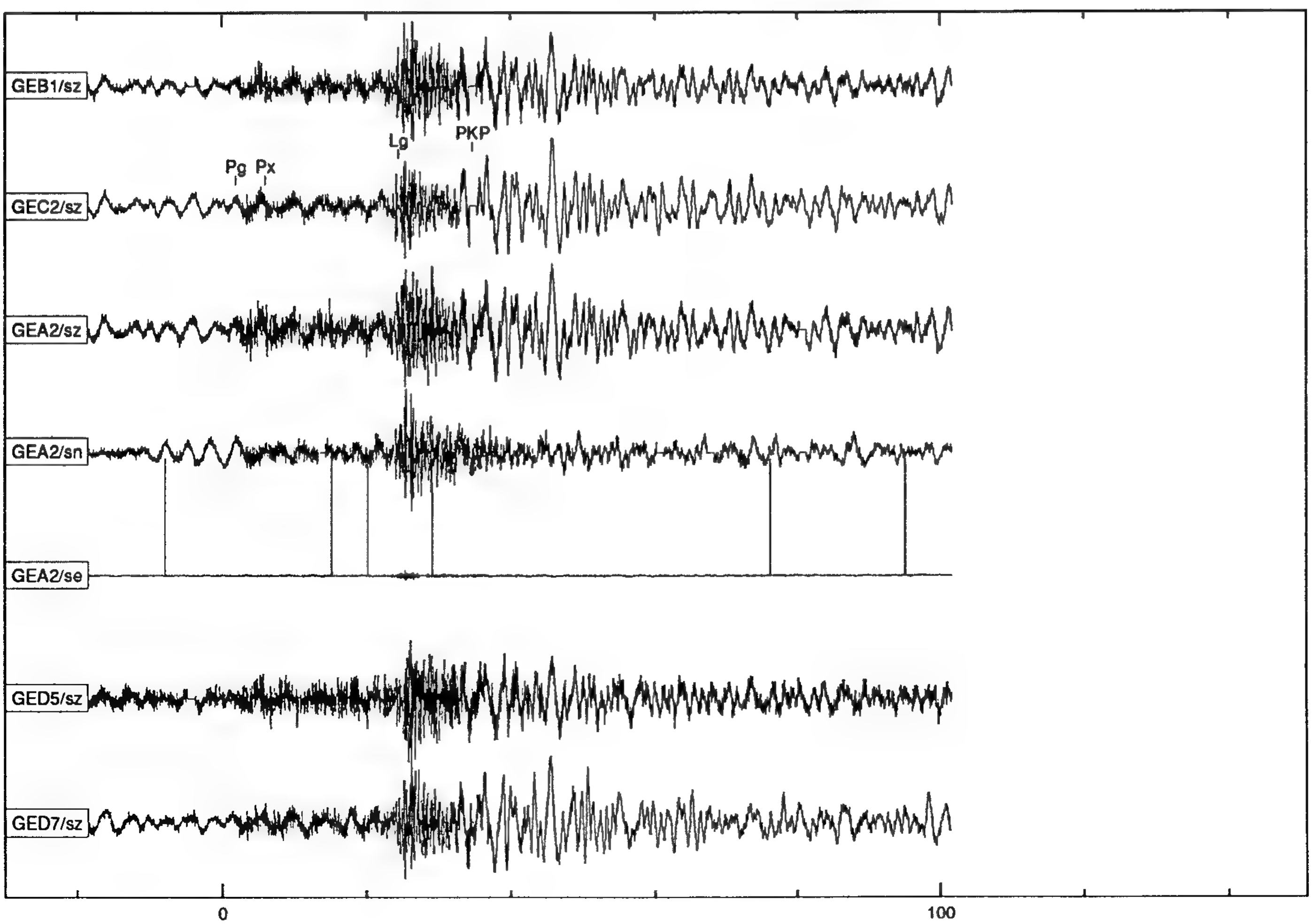
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	6:58:30.712	-1	-1.0	-1.0	-1	-1.0	1464
Px	Pg	6:58:34.650	325	14.7	5.4	0	0.3	89
Lg	Lg	6:58:53.053	319	28.4	11.2	2	0.2	90



Array Data

GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
8	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

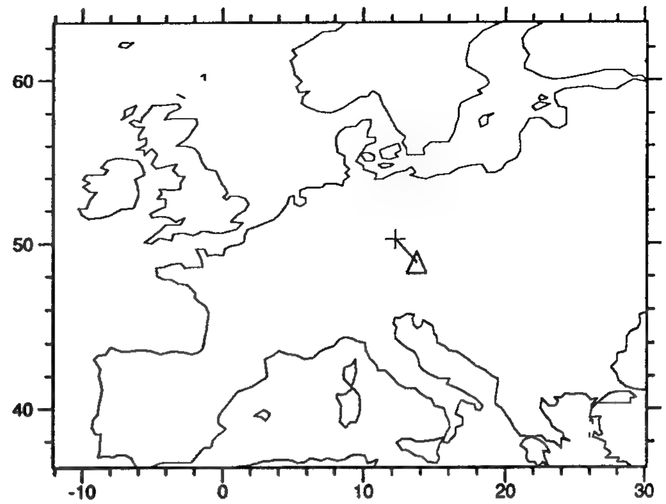
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209
7	locations good to + - 1 km due to dense network,-Schmedes, pers.comm.a	209

Data Set 1, Event 8

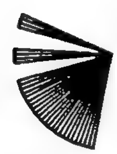
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	9:38:33.436	50.2780	12.2200	12.4000	-	-	-	-	1.65	eq+	107	NEUNHOFER

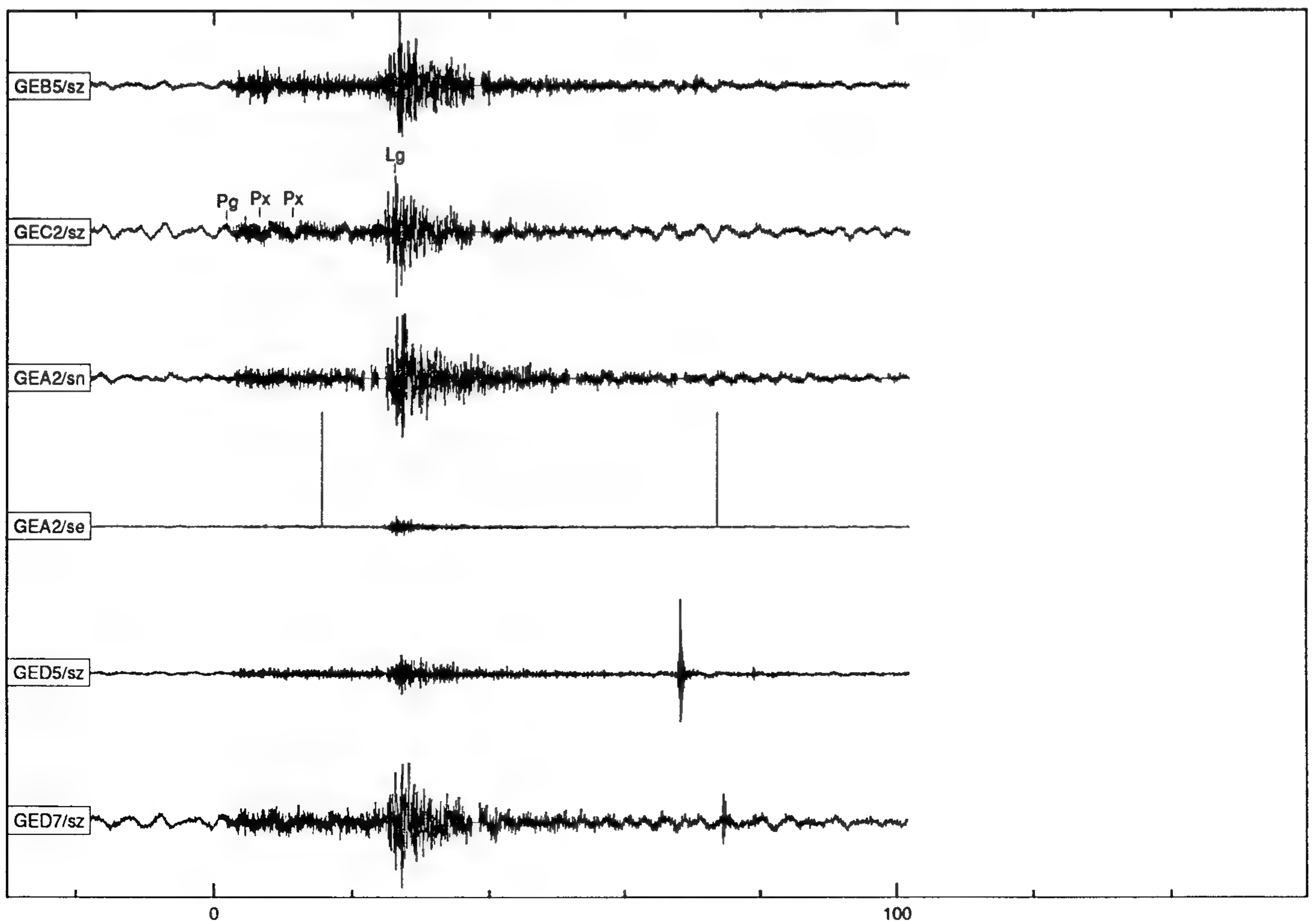
GEC2 1.729 326.64 145.51

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	9:39:4.955	-1	-1.0	-1.0	-1	-1.0	1465
Px	Pg	9:39:9.850	326	14.3	10.4	1	0.3	97
Px	Px	9:39:14.625	312	14.8	5.1	0	0.2	98
Lg	Lg	9:39:29.379	325	27.7	15.3	5	0.2	99



Array Data GSETT-2 Data





Event Number	Dataset Name	Event Type
9	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

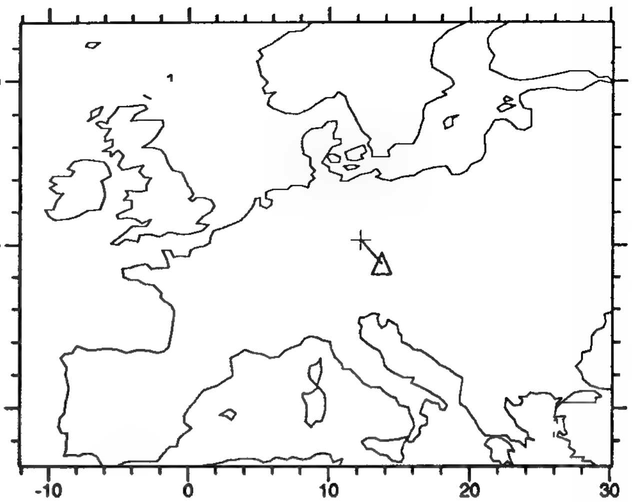
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209
9	main shock of vogtland earthquake series March 24,25,26 1991	209

Data Set 1, Event 9

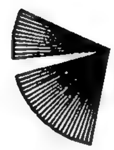
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	14:33:27.988	50.2940	12.2230	12.7000	-	-	-	-	2.07	eq+	108	NEUNHOFER

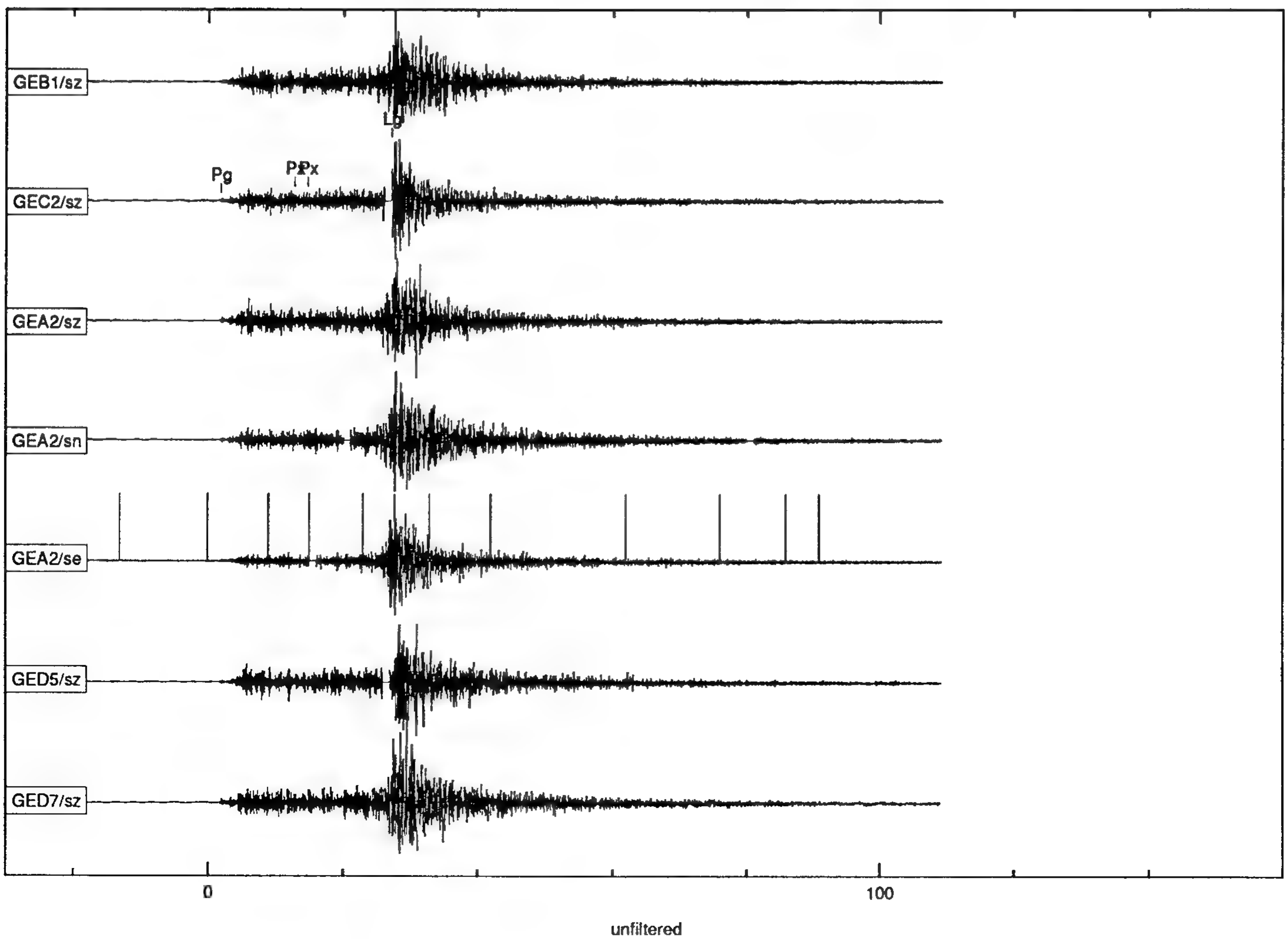
GEC2 1.741 326.99 145.86

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	14:33:59.680	323	12.3	130.8	8	0.3	113
Px	Px	14:34:10.600	337	15.5	9.0	2	0.3	114
Px	Px	14:34:12.575	317	16.9	3.3	5	0.5	103
Lg	Lg	14:34:25.149	325	28.4	21.2	45	0.2	104



Array Data GSETT-2 Data





Event Number	Dataset Name	Event Type
10	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

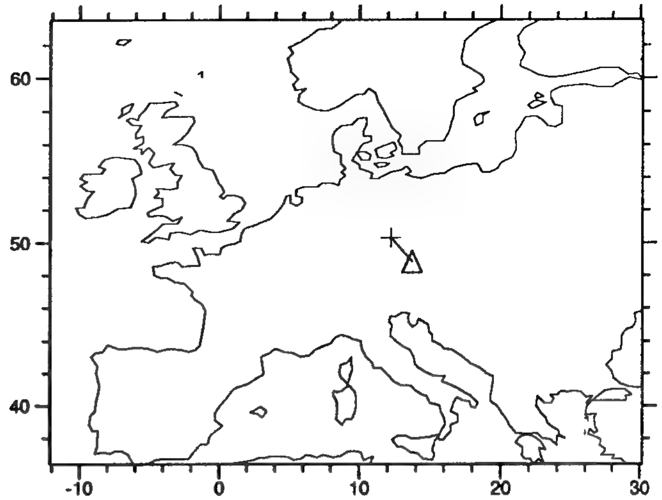
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209

Data Set 1, Event 10

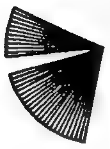
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	15:00:44.532	50.2930	12.2240	12.5000	-	-	-	-	1.80	eq+	109	NEUNHOFER

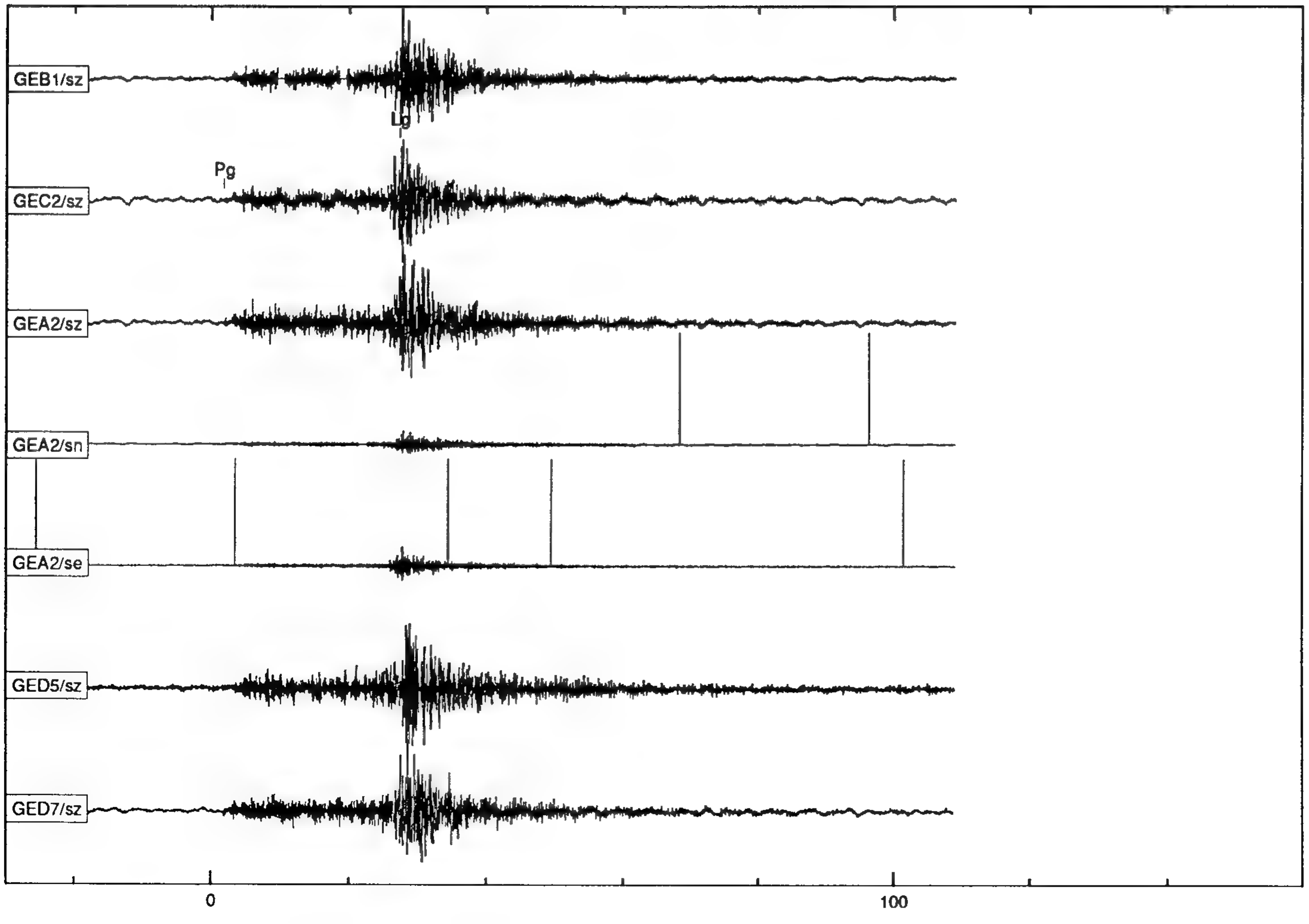
GEC2 1.740 326.99 145.86

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	15:01:16.207	323	11.8	21.3	[illegible]	0.3	108
Lg	Lg	15:01:41.701	324	28.3	16.2	10	0.2	110



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
11	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

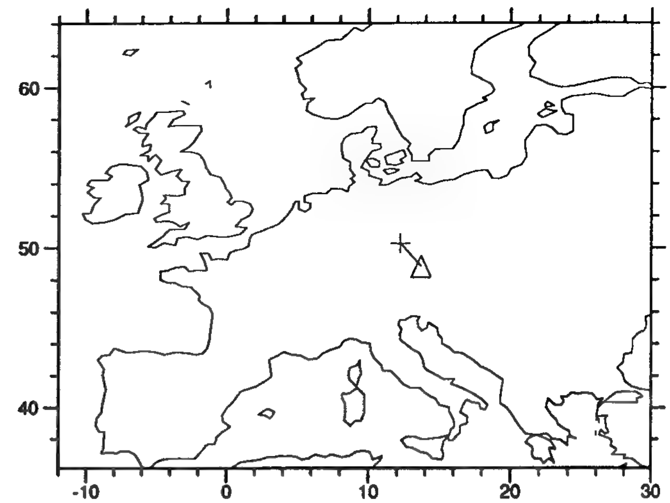
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209

Data Set 1, Event 11

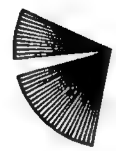
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991083	Mar 24,1991	15:41:3.515	50.2930	12.2240	9.0000	-	-	-	-	1.73	eq+	110	NEUNHOFER

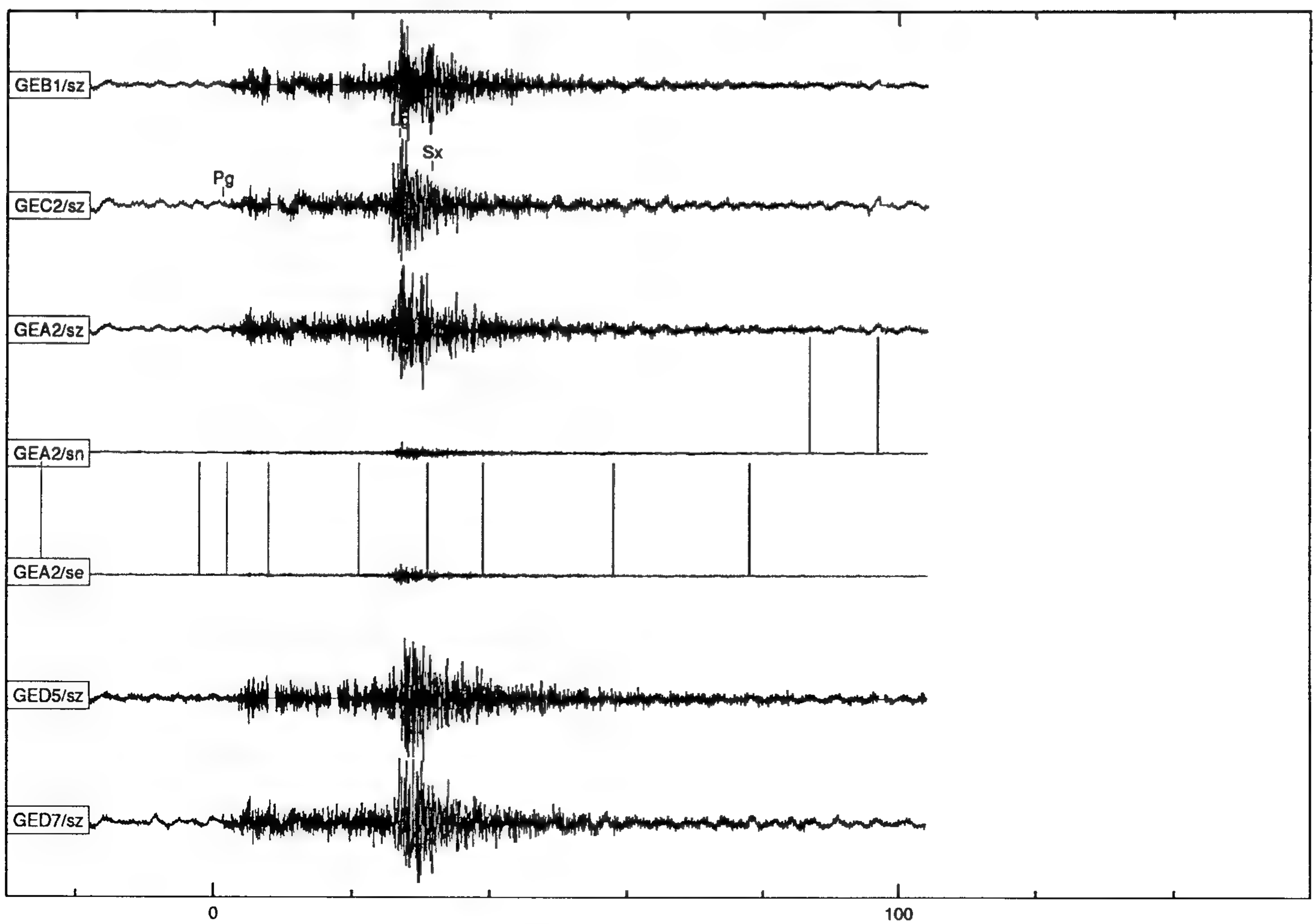
GEC2 1.740 326.99 145.86

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	15:41:35.190	320	15.3	9.9	1	0.3	115
Lg	Lg	15:42:0.570	324	28.2	15.3	6	0.2	118
Sx	Sx	15:42:5.300	315	26.1	7.7	1	0.3	119



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
12	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

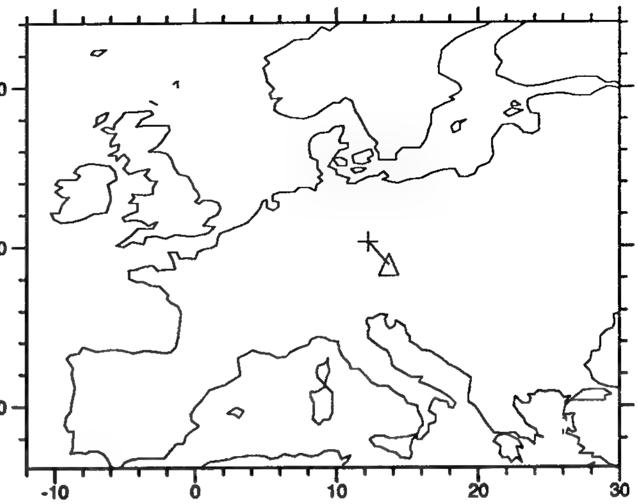
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209

Data Set 1, Event 12

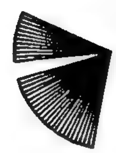
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991084	Mar 25,1991	14:54:13.507	50.2980	12.2220	12.9000	-	-	-	-	2.37	eq+	111	NEUNHOFER

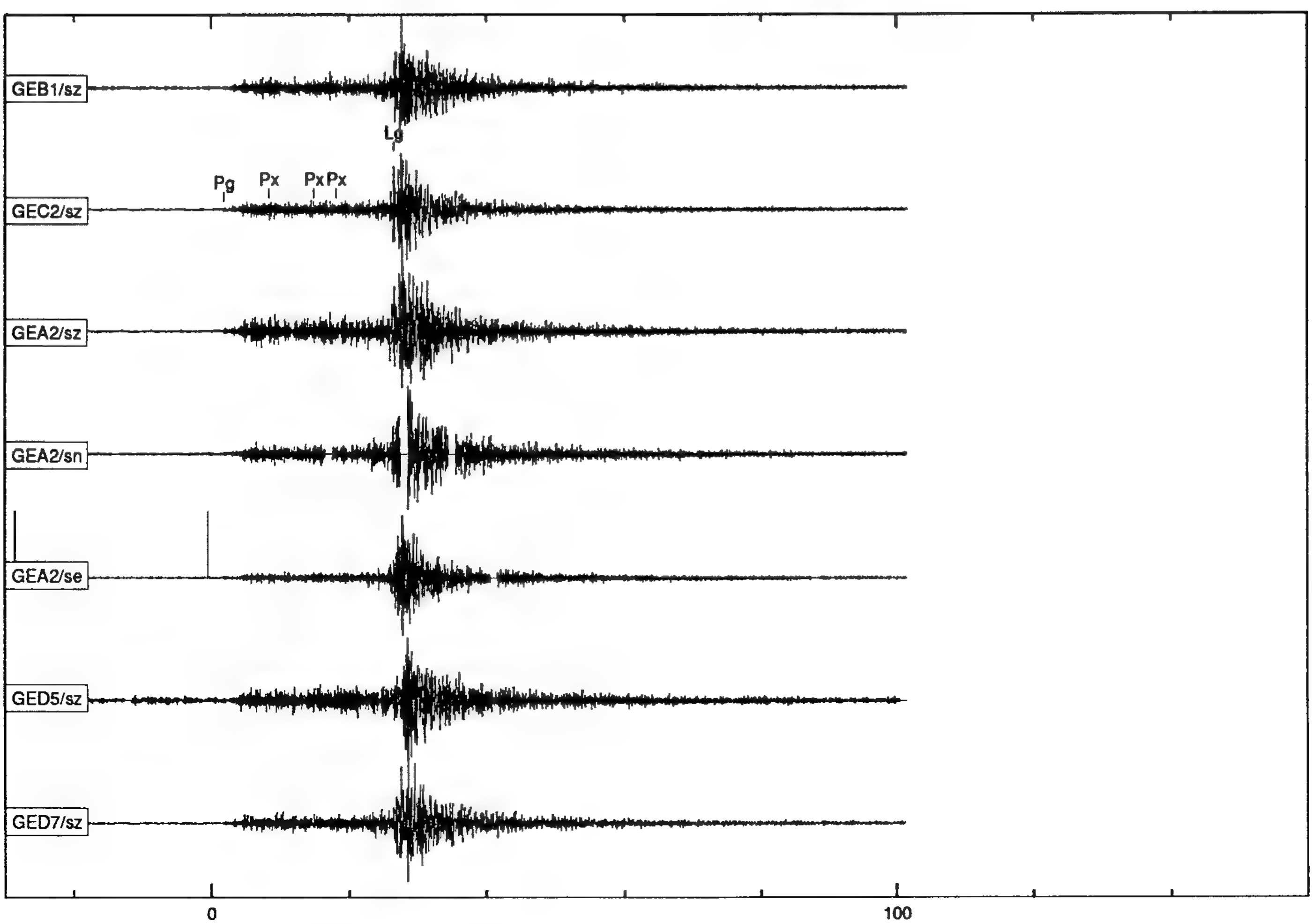
GEC2 1.744 327.04 145.92

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	14:54:45.252	-1	-1.0	-1.0	-1	-1.0	1466
Px	Pg	14:54:51.750	323	15.3	10.5	4	0.3	122
Px	Px	14:54:58.275	321	14.5	3.1	7	0.5	123
Px	Px	14:55:1.513	307	14.7	5.0	11	0.2	124
Lg	Lg	14:55:9.831	324	28.5	28.4	22	0.3	125



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
13	#1: VOGTLAND	eq+

attribute	Ground Truth	refid
etype	Earthquake in swarm	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211
depth	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991	211

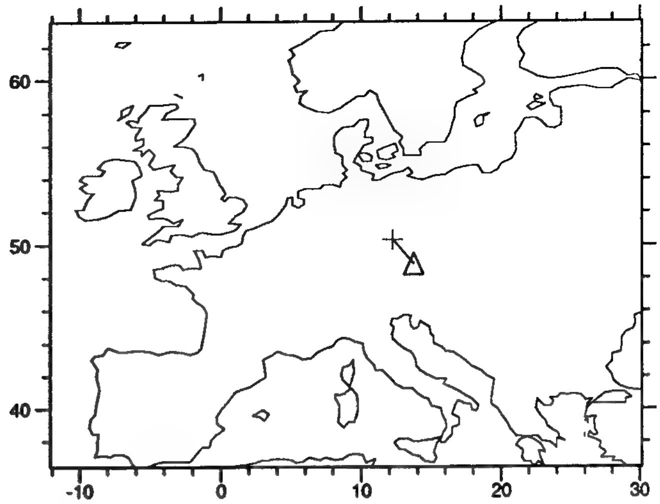
noteid	Notes	refid
1	origin times derived from GEC2 first arrival times	-999
3	vogtland earthquake series March 24,25,26 1991	209

Data Set 1, Event 13

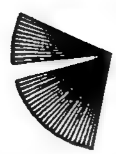
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991084	Mar 25,1991	22:31:45.761	50.2920	12.2130	12.0000	-	-	-	-	1.54	eq+	112	NEUNHOFER

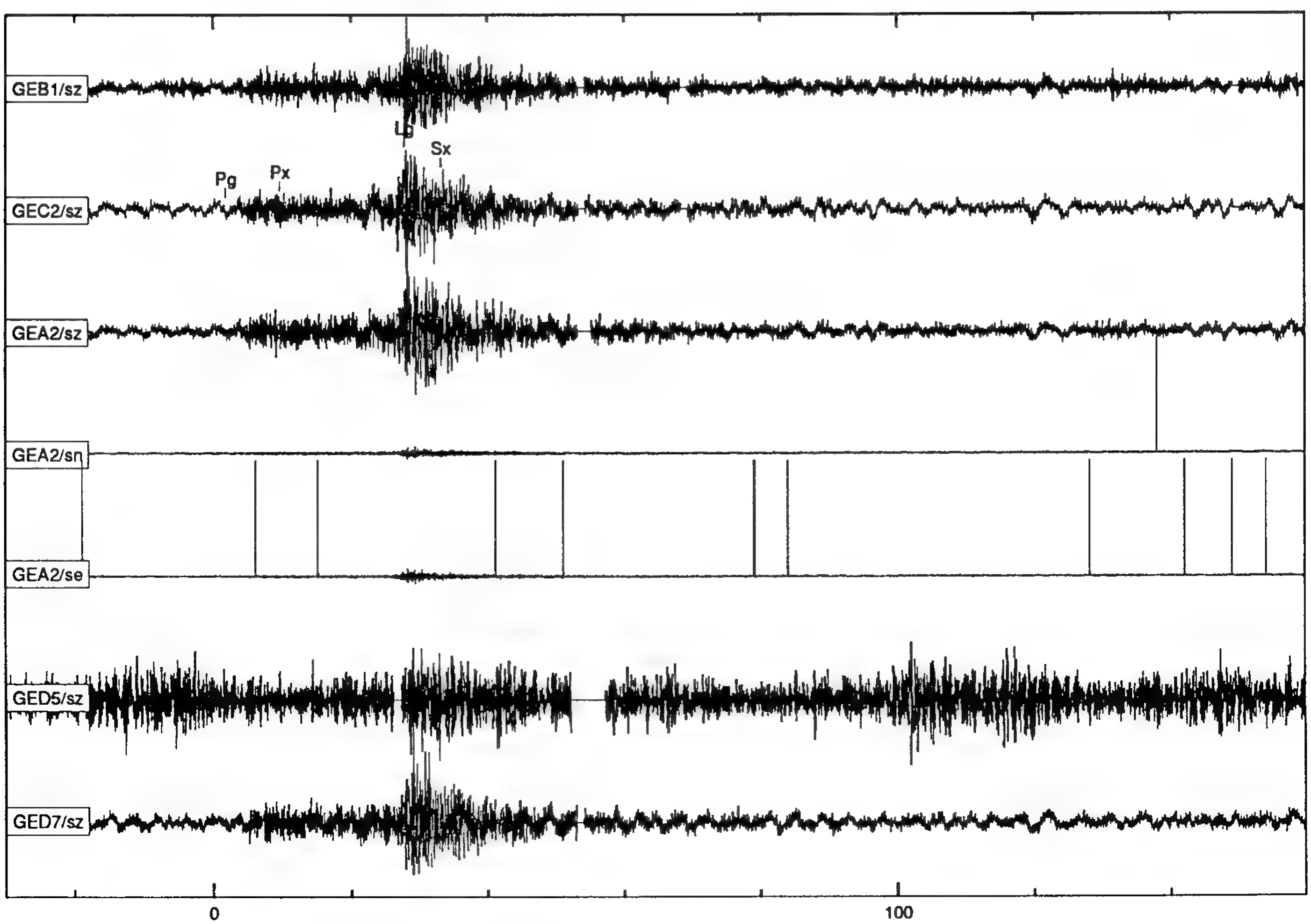
GEC2 1.743 326.77 145.64

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	22:32:17.481	-1	-1.0	-1.0	-1	-1.0	1467
Px	Pg	22:32:25.237	330	15.8	8.1	1	0.1	127
Lg	Lg	22:32:43.480	318	28.2	10.4	4	0.2	129
Sx	Lg	22:32:48.800	340	29.4	4.7	1	0.3	130



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
15	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Nove Seldo open pit coal mine	501
lat,lon	Nove Sedlo, minid=1228	501
depth	0	510
totcha	3575 kg	501

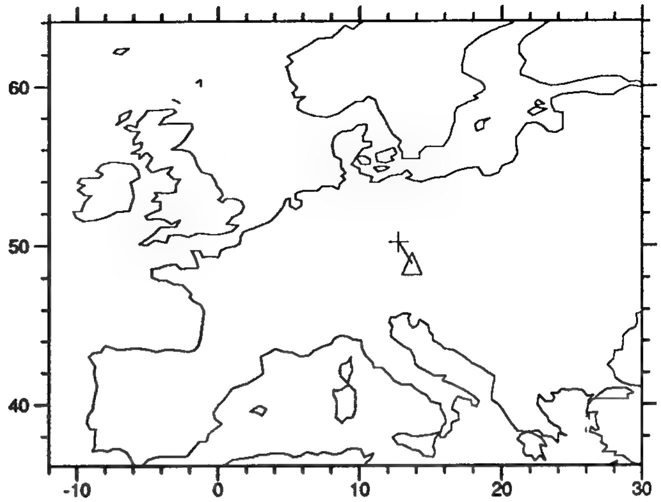
	Notes	
1	origin times derived from GEC2 first arrival times	-999
9	quarry blast identified by Petr Firbas	501

Data Set 1, Event 15

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991122	May 2,1991	11:06:10.221	50.2070	12.7130	0.0000	-	-	-	-	1.93	qb	113	FIRBAS

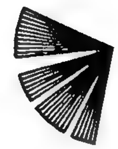
GEC2 1.508 335.08 154.33

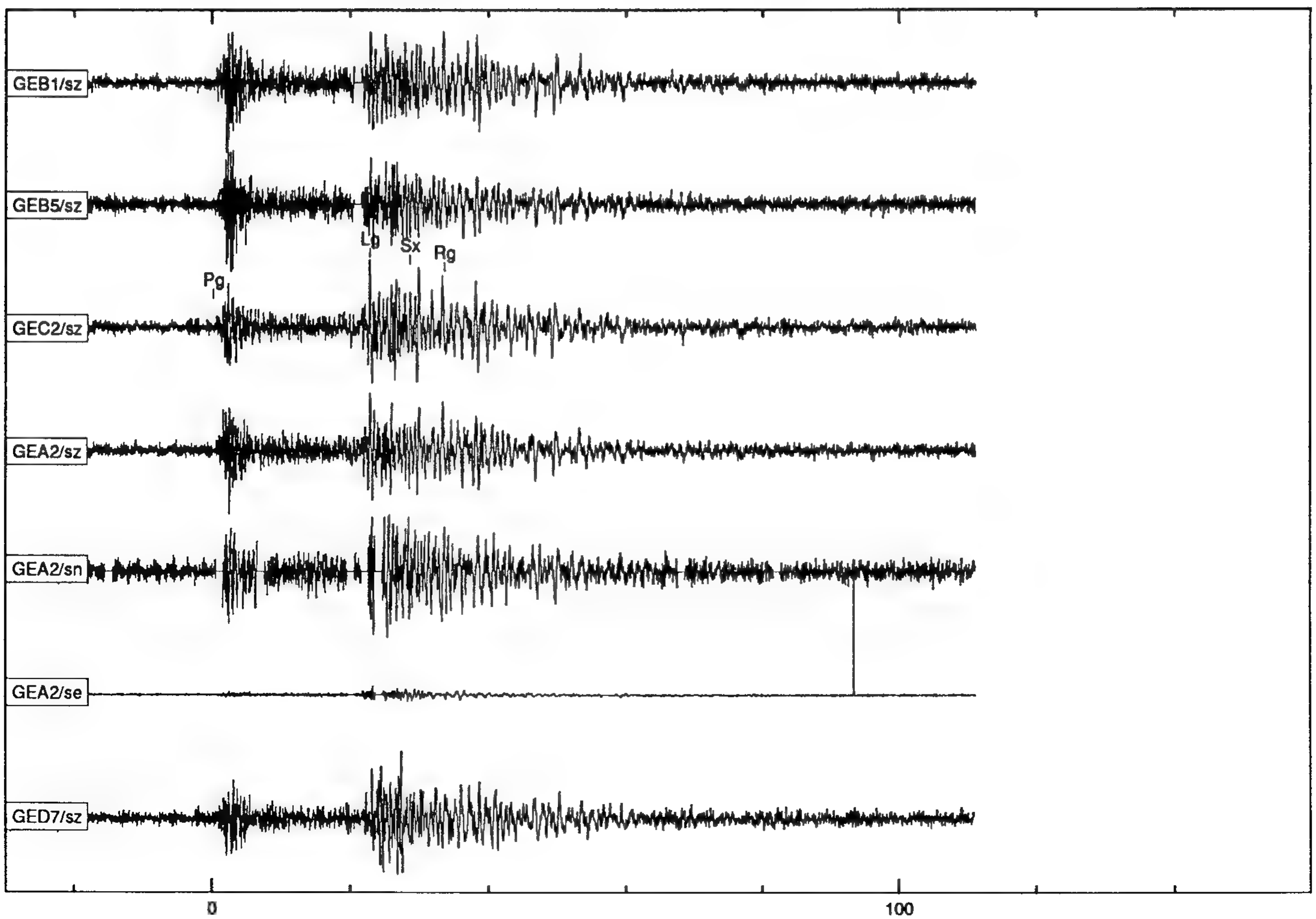
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	11:06:38.583	338	16.1	10.2	10	0.7	140
Lg	Sx	11:07:1.210	334	26.9	10.4	14	0.3	141
Sx	Lg	11:07:7.050	324	32.7	4.7	20	0.6	142
Rg	Rg	11:07:12.000	328	35.0	3.7	25	0.9	143



Array Data

GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
16	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast confirmed by Klinge in Wüster, 1992	501
lat,lon	not known, location of stations SGB used location	-999

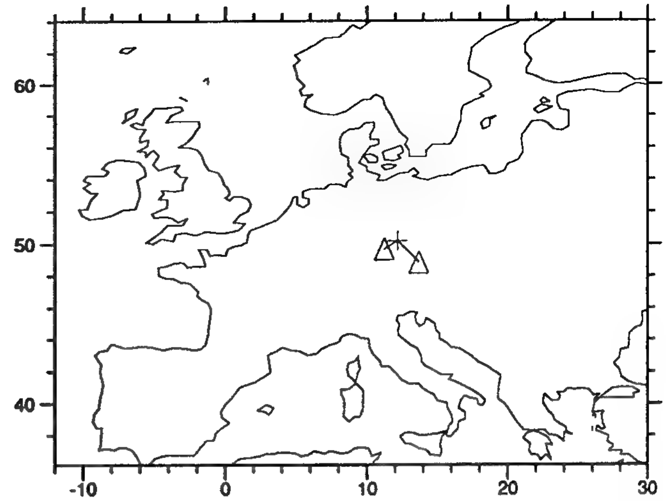
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
4	Quarry blast identified by Klinge for Wüster	209
8	location uncertainty large, put at sta SGB for lack of better location	501

Data Set 1, Event 16

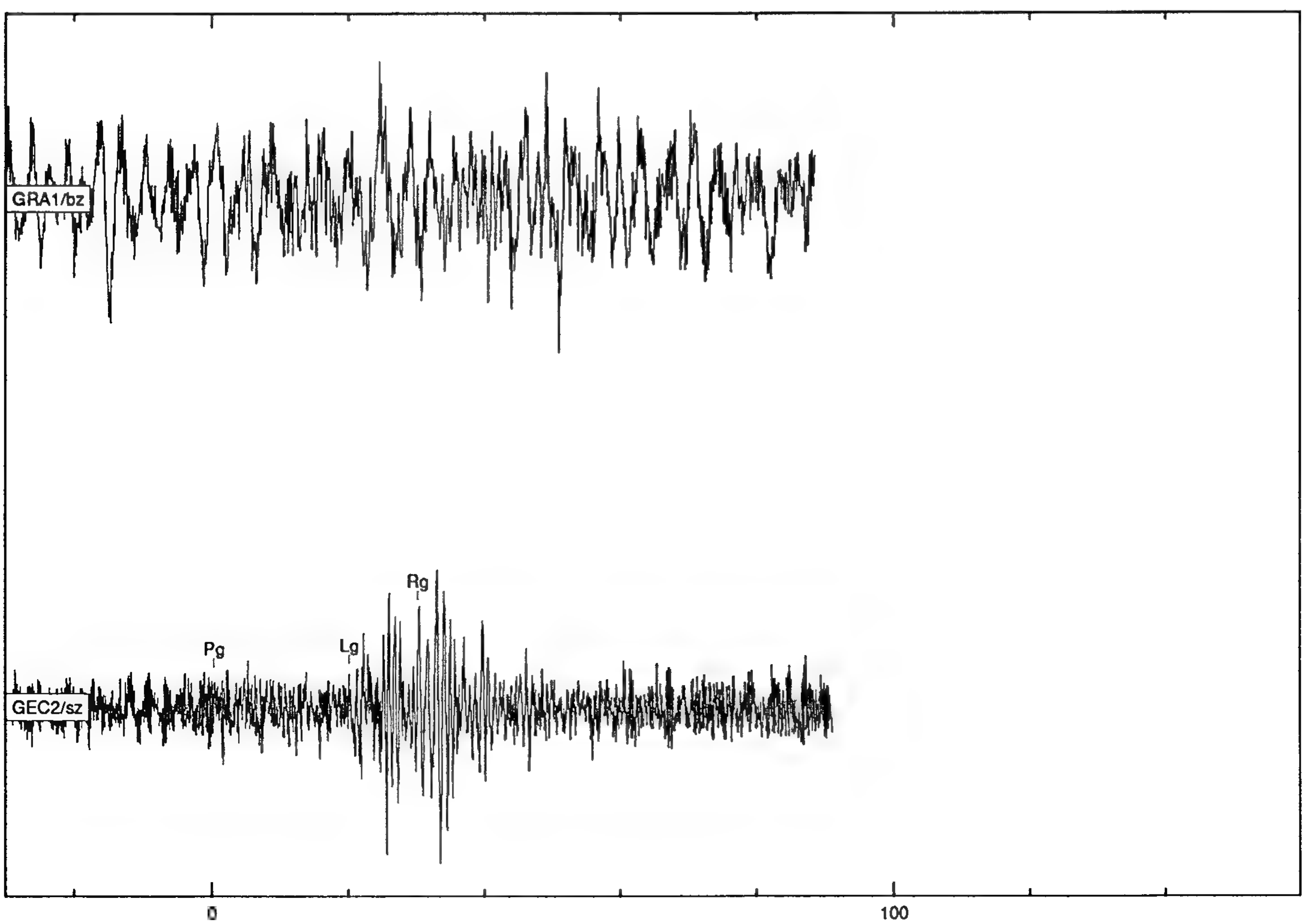
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991122	May 2,1991	12:47:33.067	50.1840	12.1860	0.0000	-	-	-	-	2.03	qb	114	WUSTER

GEC2 1.665 324.18 143.03

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	12:48:3.675	318	18.1	4.5	1	0.5	144
Lg	Lg	12:48:23.475	314	30.4	13.0	20	0.8	145
Rg	Rg	12:48:33.575	312	34.0	4.7	26	1.0	146



Array Data GSETT-2 Data



unfiltered

Event Number	Dataset Name	Event Type
17	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Nove Sedlo open pit coal mine	501
lat,lon	Nove Sedlo (minid=1228)	501
depth	0	501
totcha	3330 kg	501

noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501
	GEC2/sz dead	-999

Data Set 1, Event 17

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991128	May 8,1991	11:14:37.513	50.2070	12.7130	0.0000	-	-	-	-	2.00	qb	115	FIRBAS

GRA1 1.093 61.27 242.41

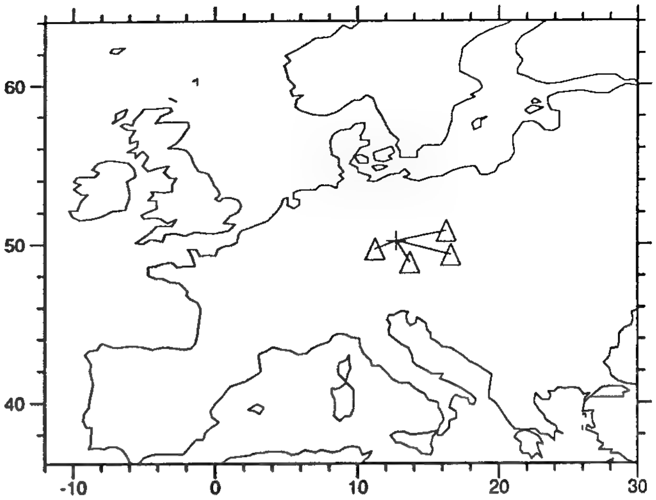
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	11:15:0.250	-1	-1.0	-1.0	38	0.5	302
Lg	Lg	11:15:16.800	-1	-1.0	-1.0	83	0.6	303

GEC2 1.508 335.08 154.33

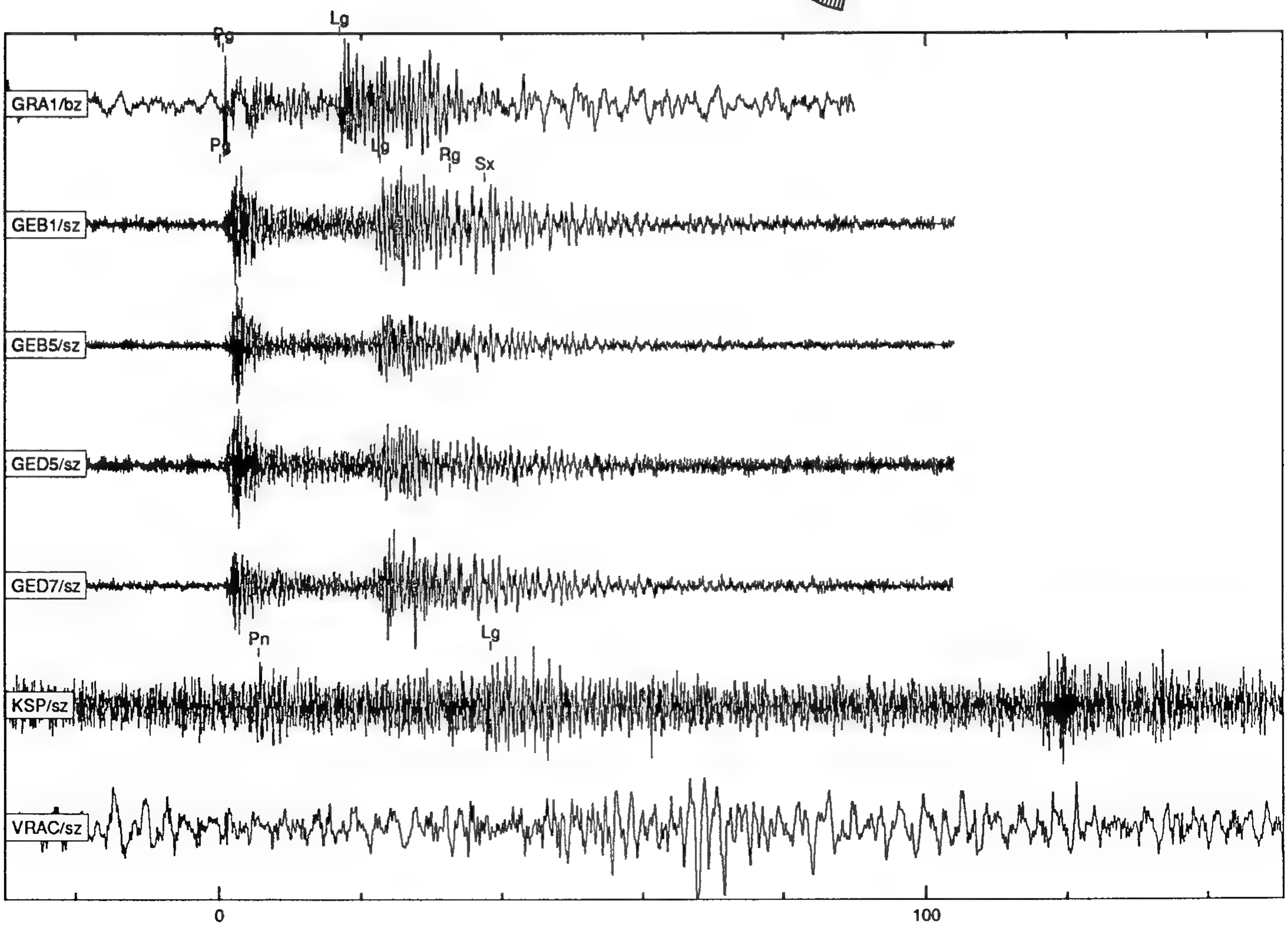
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:15:5.875	340	15.4	39.9	2	0.1	153
Lg	Lg	11:15:28.253	329	22.0	15.9	17	0.5	155
Rg	Sx	11:15:38.125	321	30.2	5.3	12	0.6	156
Sx	N	11:15:43.049	324	40.5	4.0	20	0.7	157

KSP 2.372 255.80 73.05

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:15:23.025	-1	-1.0	-1.0	-1	-1.0	1472
Lg	Lg	11:15:55.900	-1	-1.0	-1.0	-1	-1.0	1471



Array Data GSETT-2 Data



unfiltered

Event Number	Dataset Name	Event Type
18	#1: VOGTLAND	eq

attribute	Ground Truth	
etype	single earthquake, listed in PB	211
lat,lon	not located in Preliminary Bulletin of Vogtland/ West Bohemia Microearthquakes for 1991, used Wüster's location	209

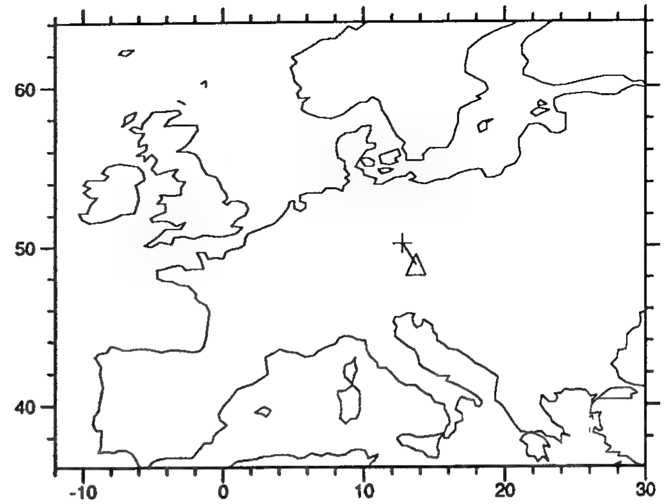
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999

Data Set 1, Event 18

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991130	May 10,1991	20:02:51.112	50.7900	12.0700	-999.0000	-	-	-	-	1.43	eq	116	WUSTER

GEC2 2.215 332.12 150.88

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	20:03:29.575	336	16.9	4.6	0	0.3	162
Lg	Lg	20:04:2.133	316	25.8	4.5	1	0.4	164



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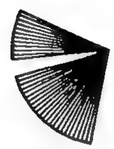
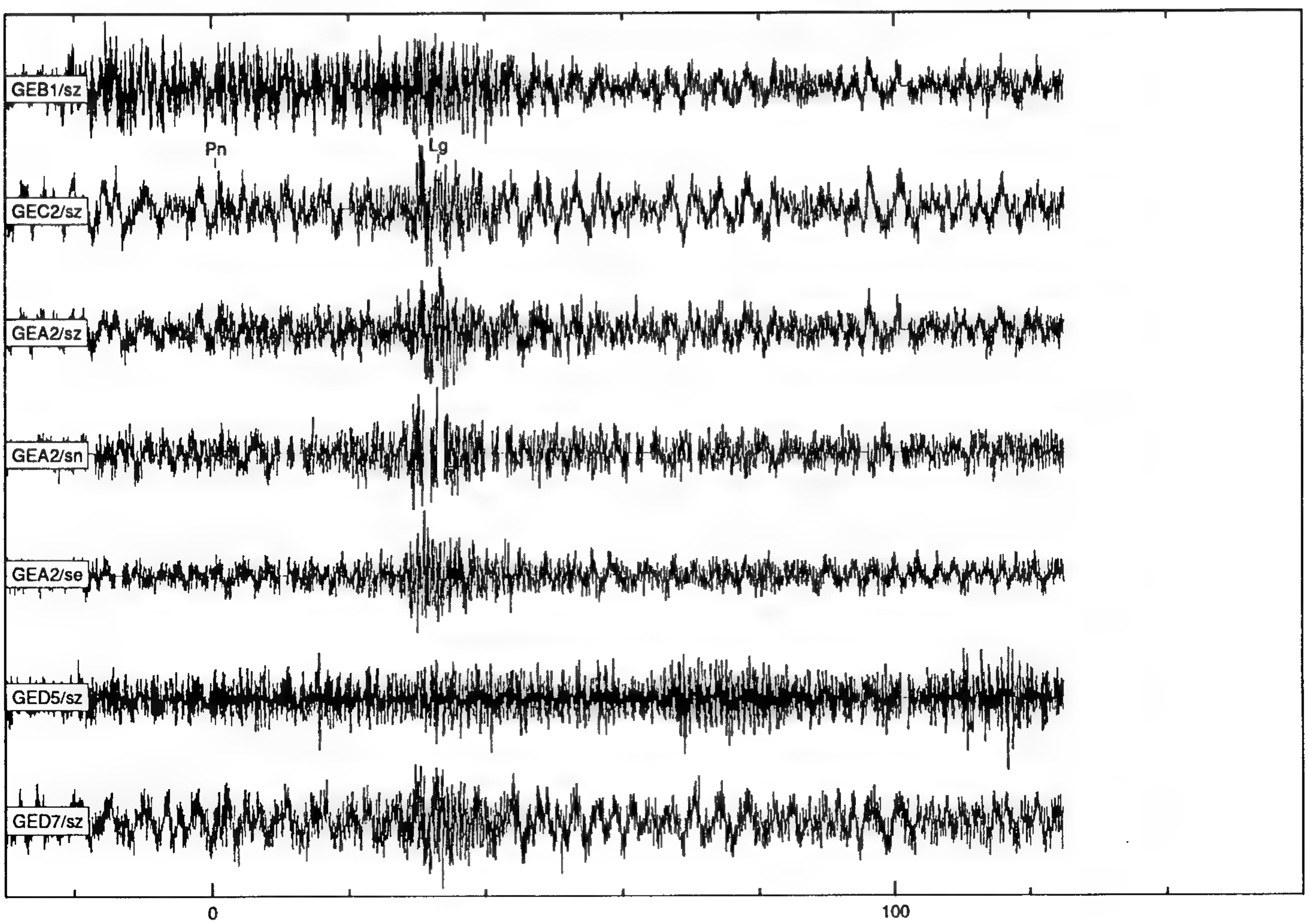




unfiltered

Event Number	Dataset Name	Event Type
19	#1: VOGTLAND	eq

attribute	Ground Truth	
etype	single earthquake, listed in PB,	211
lat,lon	from Preliminary Bulletin of Vogtland/West Bohemia Microearthquakes for 1991. (located by 17 stations in the Vogtland network. The nearest, KLI, is 7.3 km from the published location. The farthest, MOX, is 66 km from the published location.)	211
depth	depth estimated by above 17 stations is 0.0 (4.9) km.	211

noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999

Data Set 1, Event 19

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991139	May 19,1991	3:22:10.000	50.3600	12.3710	0.0000	-	-	-	-	2.06	eq	117	NEUNHOFER

GRA1 0.998 47.50 228.38

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	3:22:31.301	-1	-1.0	-1.0	78	0.5	306
Lg	-	3:22:46.150	-1	-1.0	-1.0	118	0.8	307

GEC2 1.746 330.78 149.77

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	3:22:41.770	334	13.9	619.7	16	0.1	165
Px	Px	3:22:49.600	346	17.6	5.3	2	0.3	166
Lg	Lg	3:23:7.357	327	26.6	14.2	18	0.2	167
Sx	Sx	3:23:12.800	304	21.4	5.0	12	0.3	168

KSP 2.546 260.56 77.53

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:22:53.200	-1	-1.0	-1.0	-1	-1.0	1476
Px	Pg	3:22:58.100	77	5.0	-1.0	12	0.1	312
Lg	S	3:23:31.250	-1	-1.0	-1.0	37	0.5	313

VRAC 2.930 292.65 109.43

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:22:58.630	-1	-1.0	-1.0	-1	-1.0	1473
Px	Pn	3:23:5.199	318	-1.0	-1.0	1817	2.0	321
Lg	Sn	3:23:43.790	-1	-1.0	-1.0	69382	0.8	322

OSS 3.963 21.11 202.78

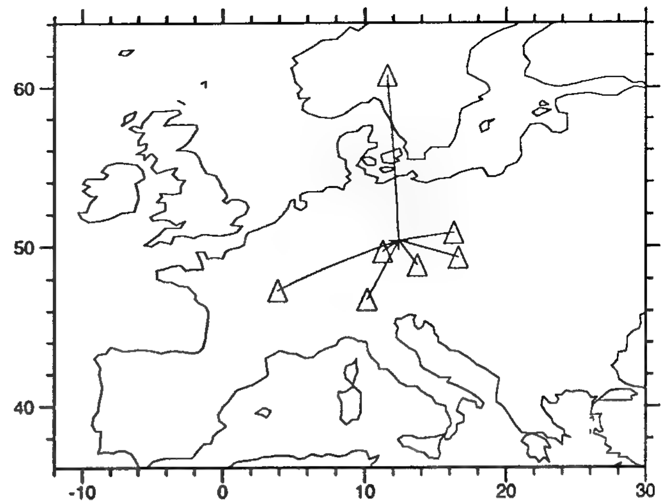
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	P	3:23:12.469	-1	-1.0	-1.0	1	0.2	314
Lg	Sn	3:24:19.109	-1	-1.0	-1.0	-1	-1.0	1475

LOR 6.421 58.05 244.45

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:23:45.301	-1	-1.0	-1.0	4	0.2	308
Px	Pg	3:24:11.100	-1	-1.0	-1.0	-1	-1.0	309
Lg	Sg	3:25:35.900	-1	-1.0	-1.0	-1	-1.0	310

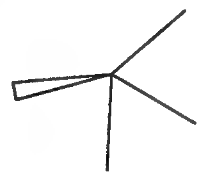
NRA0 10.411 177.06 357.74

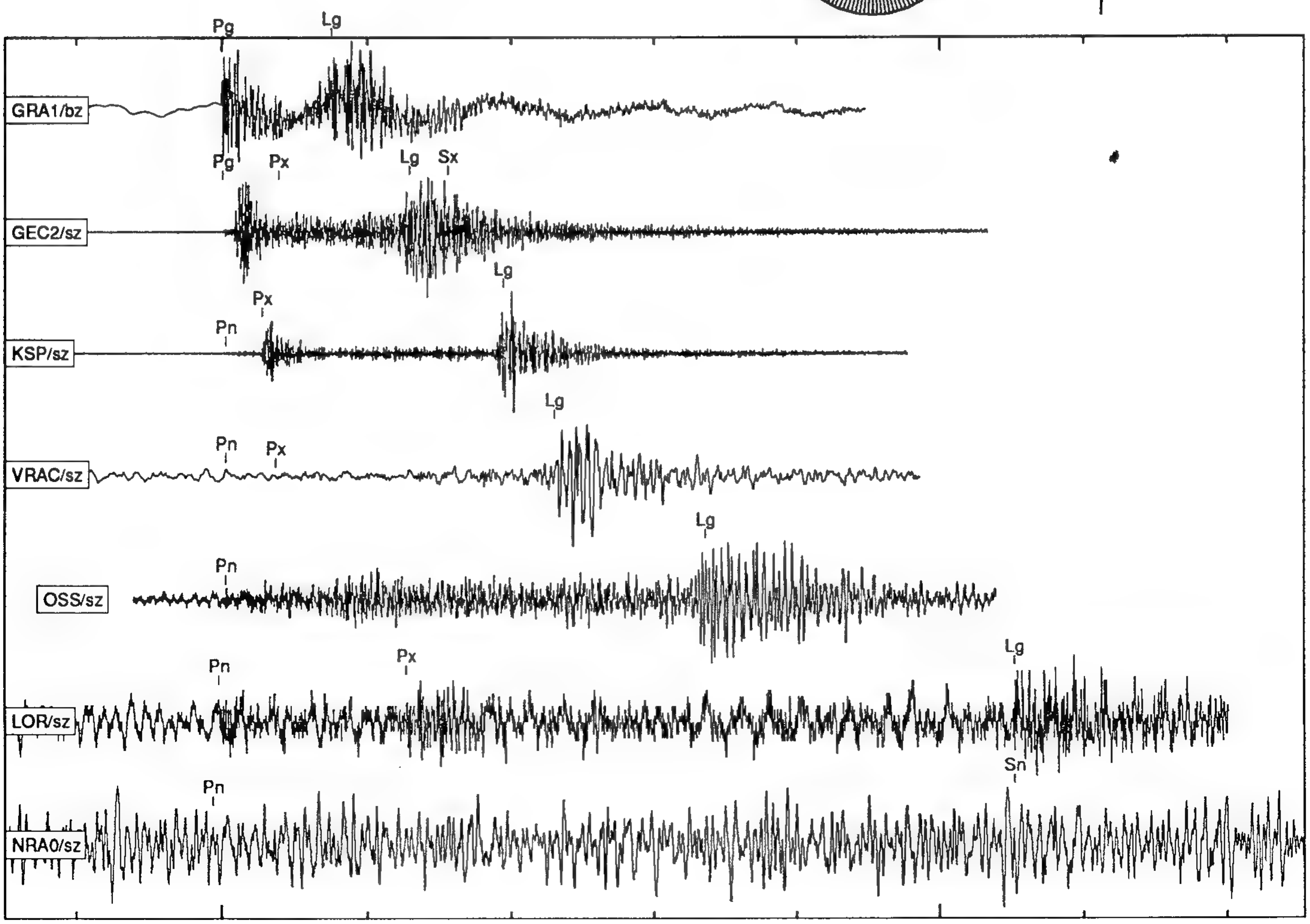
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:24:39.281	181	12.8	5.4	0	0.2	169
Sn	Sn	3:26:30.831	-1	-1.0	-1.0	-1	-1.0	1474



Array Data

GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
20	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Nove Sedlo open pit coal mine	501
lat,lon	Nove Sedlo (minid=1228)	501
depth	0	501
totcha	3135 kg	501

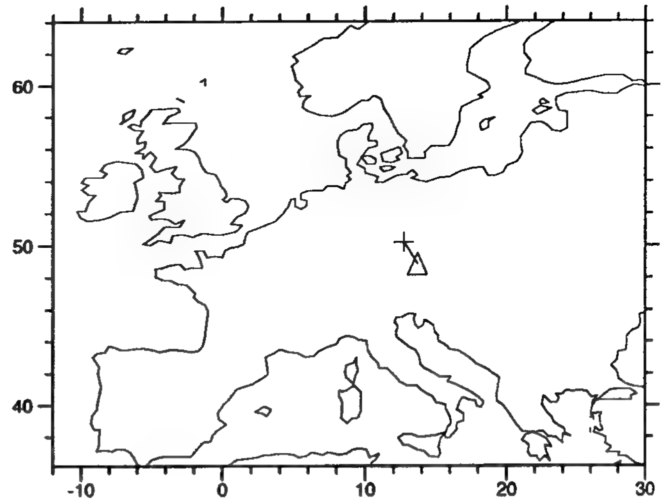
noteid	Notes	refid
9	Quarry blast identified by Petr Firbas	-999
1	Origin time derived from GEC2 arrival times	-999
	Double event, not mixed. Event 20 is the first of the two; bonus event is orid 229 in *origin* table.	-999

Data Set 1, Event 20

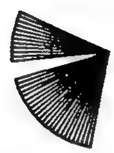
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991143	May 23,1991	11:01:5.259	50.2070	12.7130	0.0000	-	-	-	-	2.12	qb	118	FIRBAS

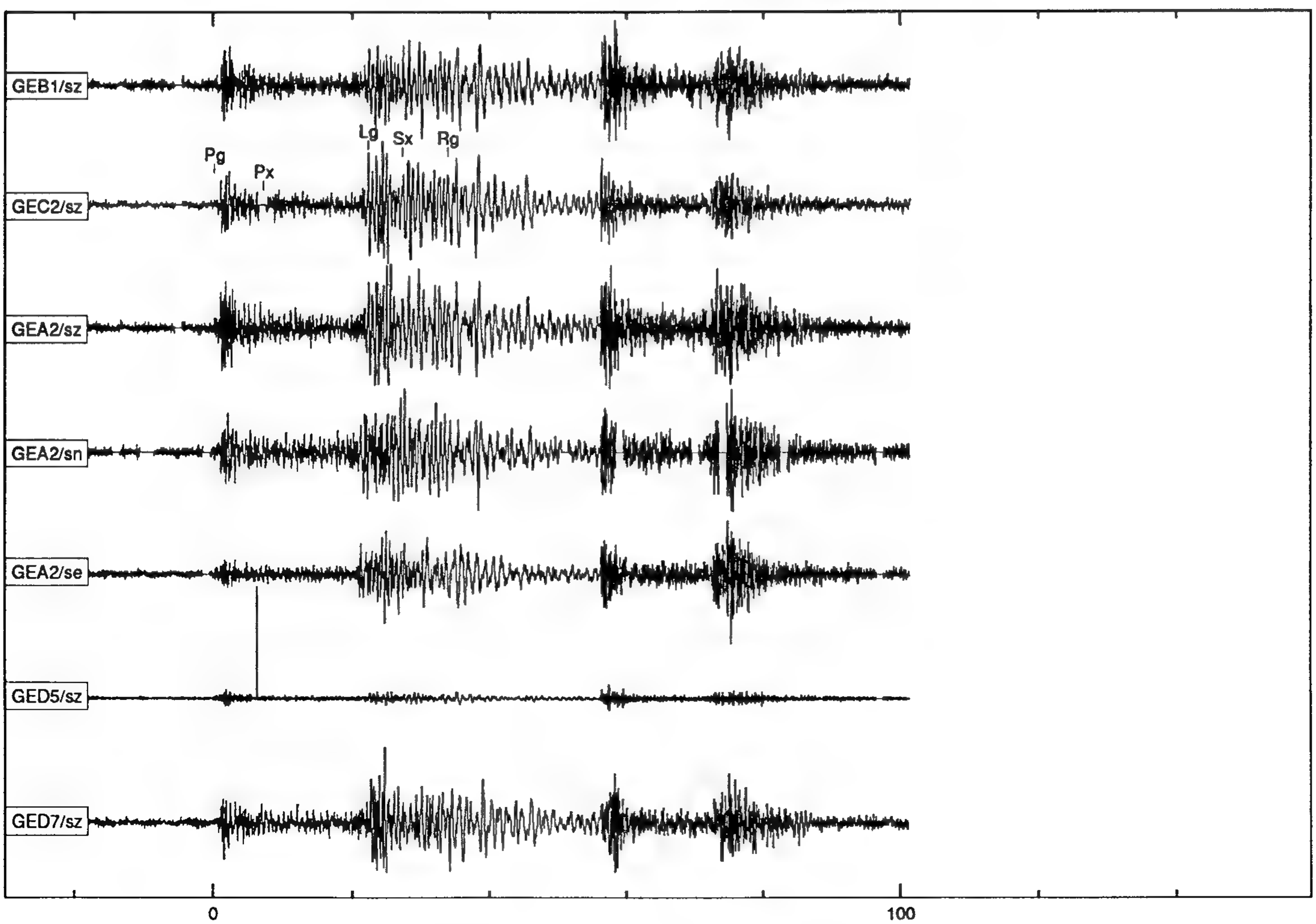
GEC2 1.508 335.08 154.33

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:01:33.621	338	16.1	37.4	6	0.3	174
Px	Px	11:01:40.574	335	16.8	6.1	[illegible]	0.6	175
Lg	Lg	11:01:55.602	335	26.1	15.4	25	0.5	176
Sx	Sx	11:02:0.749	333	24.6	15.5	31	0.7	177
Rg	Rg	11:02:7.171	-1	-1.0	-1.0	-1	-1.0	1468



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
21	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Nove Sedlo open pit coal mine	501
lat,lon	Nove Sedlo, minid=1228	501
depth	0	501
size	3135 kg	501

noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 21

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991145	May 25,1991	11:01:28.688	50.2070	12.7130	0.0000	-	-	-	-	2.13	qb	119	FIRBAS

GRA1 1.093 61.27 242.41

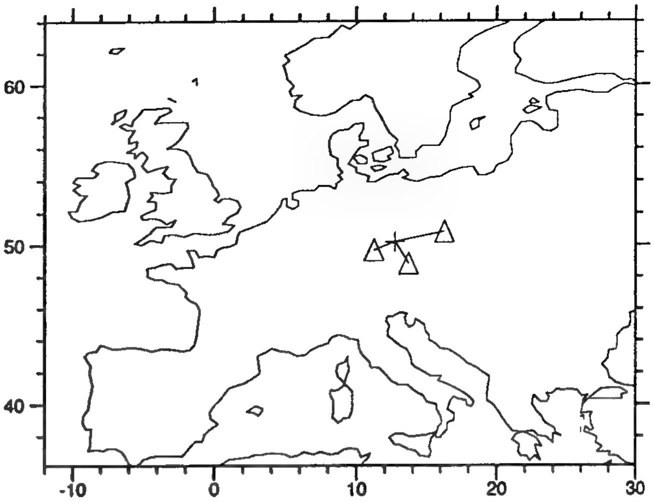
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	11:01:50.900	-1	-1.0	-1.0	43	0.6	326
Lg	S	11:02:8.000	-1	-1.0	-1.0	202	0.7	327

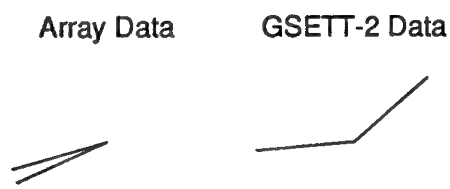
GEC2 1.508 335.08 154.33

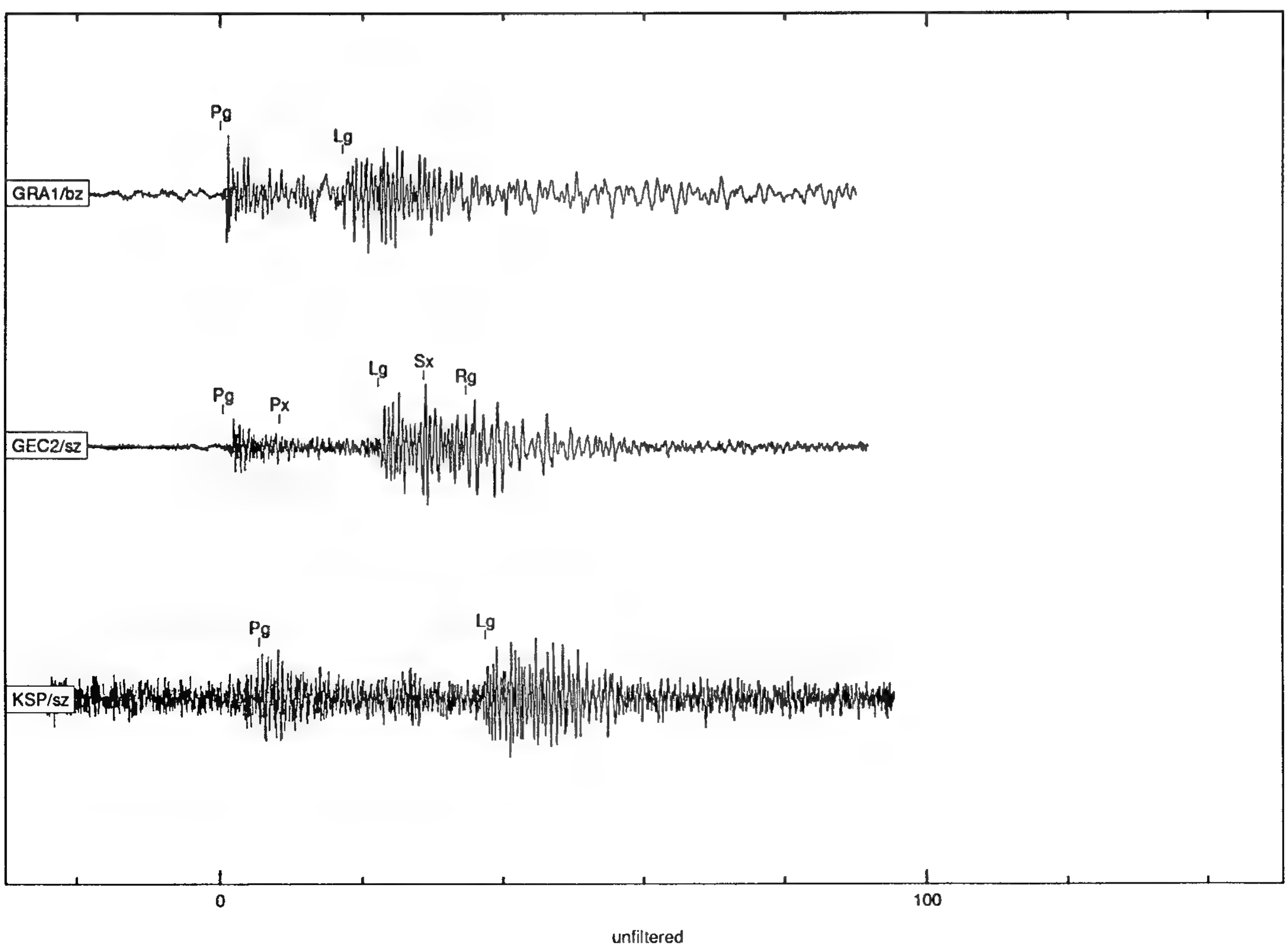
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:01:57.050	339	15.2	39.9	7	0.5	197
Px	Px	11:02:4.799	337	16.9	7.2	4	0.5	198
Lg	Lg	11:02:18.924	332	26.4	14.0	24	0.6	201
Sx	Sx	11:02:25.049	329	30.1	10.5	24	0.7	202
Rg	Sx	11:02:31.500	329	38.1	4.8	18	0.9	205

KSP 2.372 255.80 73.05

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	11:02:13.898	343	20.2	-1.0	4	0.6	324
Lg	S	11:02:46.075	-1	-1.0	-1.0	3	0.3	325







Event Number	Dataset Name	Event Type
22	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Nove Sedlo open pit coal mine	501
lat,lon	Nove Sedlo, minid=1228	501
depth	0	501
totcha	2907 kg	501

noteid	Note	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 22

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991146	May 26,1991	11:00:32.367	50.2070	12.7130	0.0000	-	-	-	-	2.14	qb	120	FIRBAS

GRA1 1.093 61.27 242.41

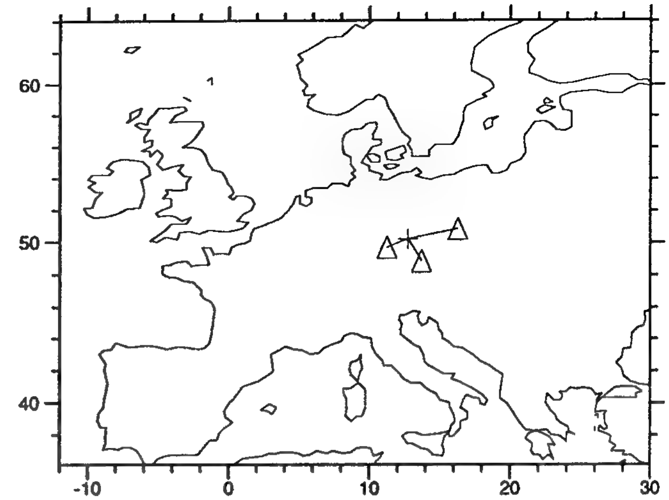
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	11:00:54.450	-1	-1.0	-1.0	39	0.5	342
Lg	-	11:01:11.700	-1	-1.0	-1.0	95	0.7	343

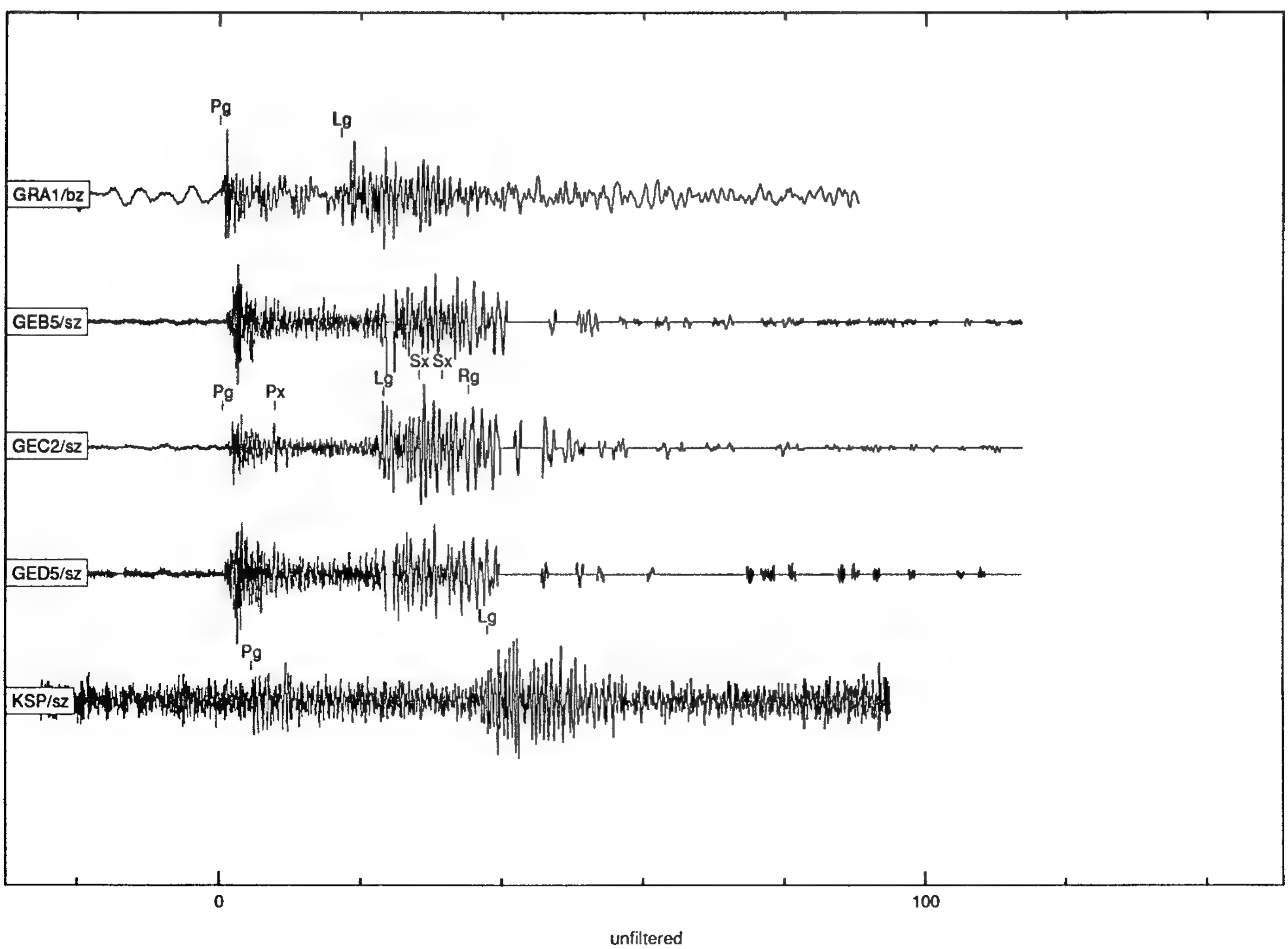
GEC2 1.508 335.08 154.33

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	11:01:0.729	339	14.1	74.1	3	0.3	216
Px	Px	11:01:8.150	339	16.3	11.3	4	0.6	217
Lg	Lg	11:01:23.206	-1	-1.0	-1.0	-1	-1.0	1477
Sx	Lg	11:01:28.624	326	33.7	15.5	32	0.7	218
Sx	Sx	11:01:31.774	318	31.4	14.7	13	0.6	219
Rg	Rg	11:01:35.354	297	30.0	9.1	14	1.1	220

KSP 2.372 255.80 73.05

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	P	11:01:16.775	105	7.2	-1.0	[illegible]	0.6	328
Lg	S	11:01:49.898	-1	-1.0	-1.0	[illegible]	0.6	329





Event Number	Dataset Name	Event Type
23	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov: (minid=1363) 50.207n 12.685e	501
depth	0	501
totcha	3575 kg	501

noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 23

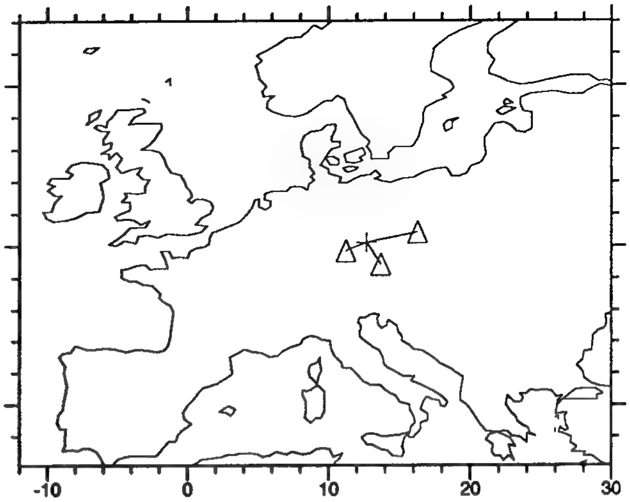
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991148	May 28,1991	11:03:51.425	50.2070	12.6850	0.0000	-	-	-	-	2.01	qb	121	FIRBAS

GRA1 1.077 60.83 241.95

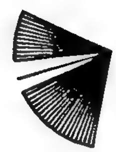
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:04:13.550	-1	-1.0	-1.0	31	0.6	347
Lg	Lg	11:04:30.150	-1	-1.0	-1.0	118	0.7	348

GEC2 1.516 334.47 153.70

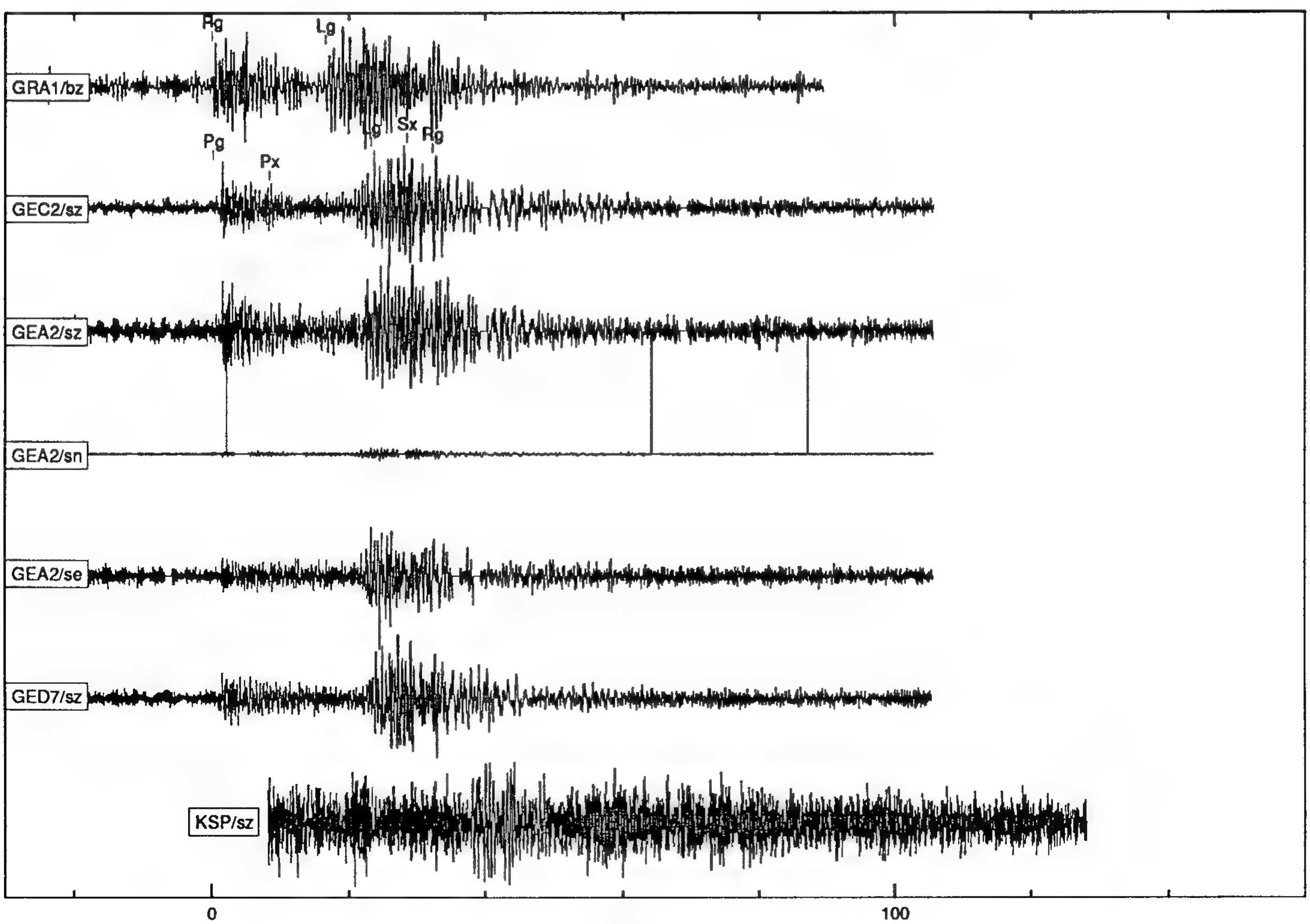
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:04:19.900	340	14.2	26.8	4	0.4	225
Px	Px	11:04:28.000	336	14.0	8.2	6	0.5	226
Lg	Lg	11:04:42.849	326	31.5	10.9	17	0.6	227
Sx	Sx	11:04:48.024	333	25.2	9.8	15	0.4	228
Rg	Rg	11:04:51.924	328	31.0	4.4	11	0.6	229



Array Data



GSETT-2 Data



GRA1 filtered 1-5 Hz

Event Number	Dataset Name	Event Type
24	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov , minid=1363	501
depth	0	501
totcha	1998 kg	501

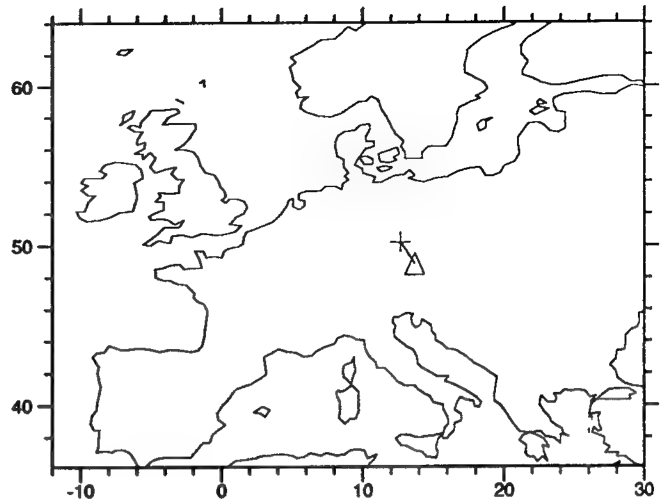
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 24

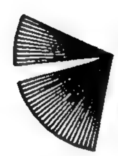
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991171	Jun 20,1991	11:01:16.808	50.2070	12.6850	0.0000	-	-	-	-	1.98	qb	122	FIRBAS

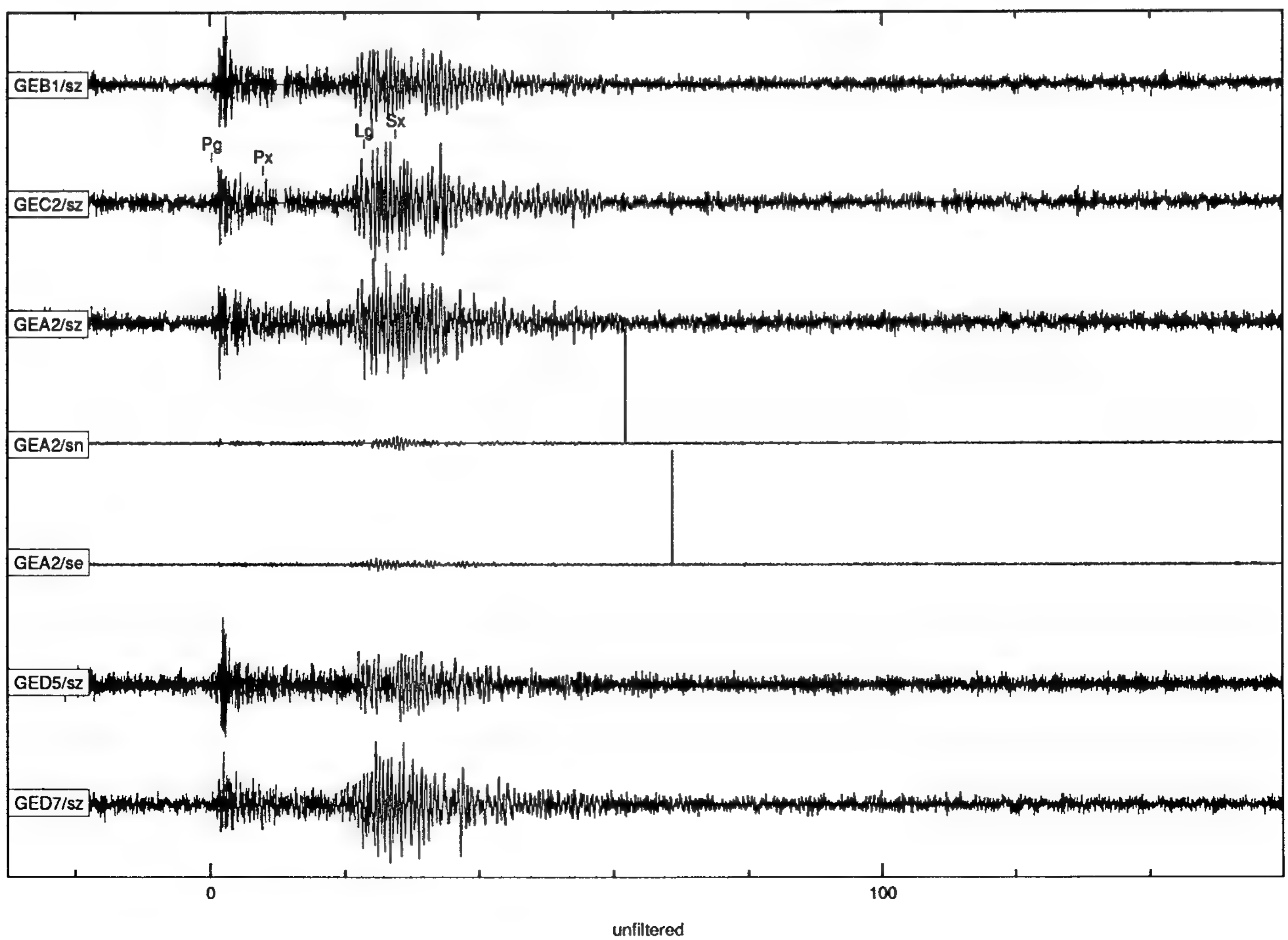
GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:01:45.282	340	15.6	17.7	4	0.4	237
Px	Px	11:01:52.750	340	14.6	5.5	4	0.5	240
Lg	Lg	11:02:7.846	335	30.9	17.4	24	0.6	242
Sx	Lg	11:02:12.624	332	27.9	11.9	9	0.5	243



Array Data GSETT-2 Data





Event Number	Dataset Name	Event Type
25	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Probable blast in Depoltivice stone quarry	501
lat,lon	Depoltivice, minid=1066	501
depth	0	501

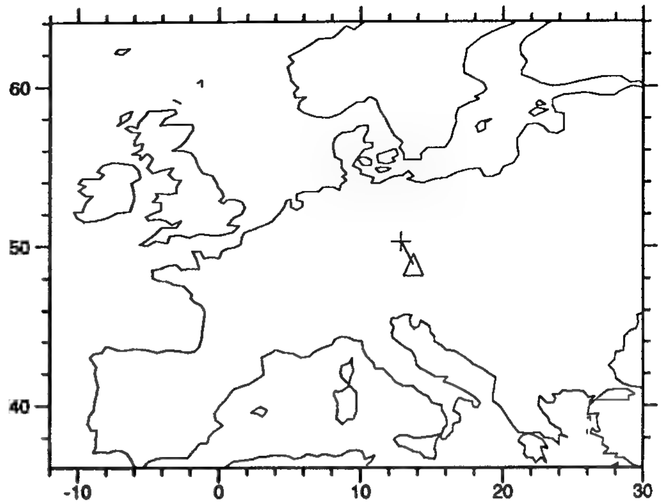
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 25

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991171	Jun 20,1991	11:45:35.486	50.2930	12.8030	0.0000	-	-	-	-	1.80	qb	123	FIRBAS

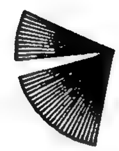
GEC2 1.563 338.36 157.68

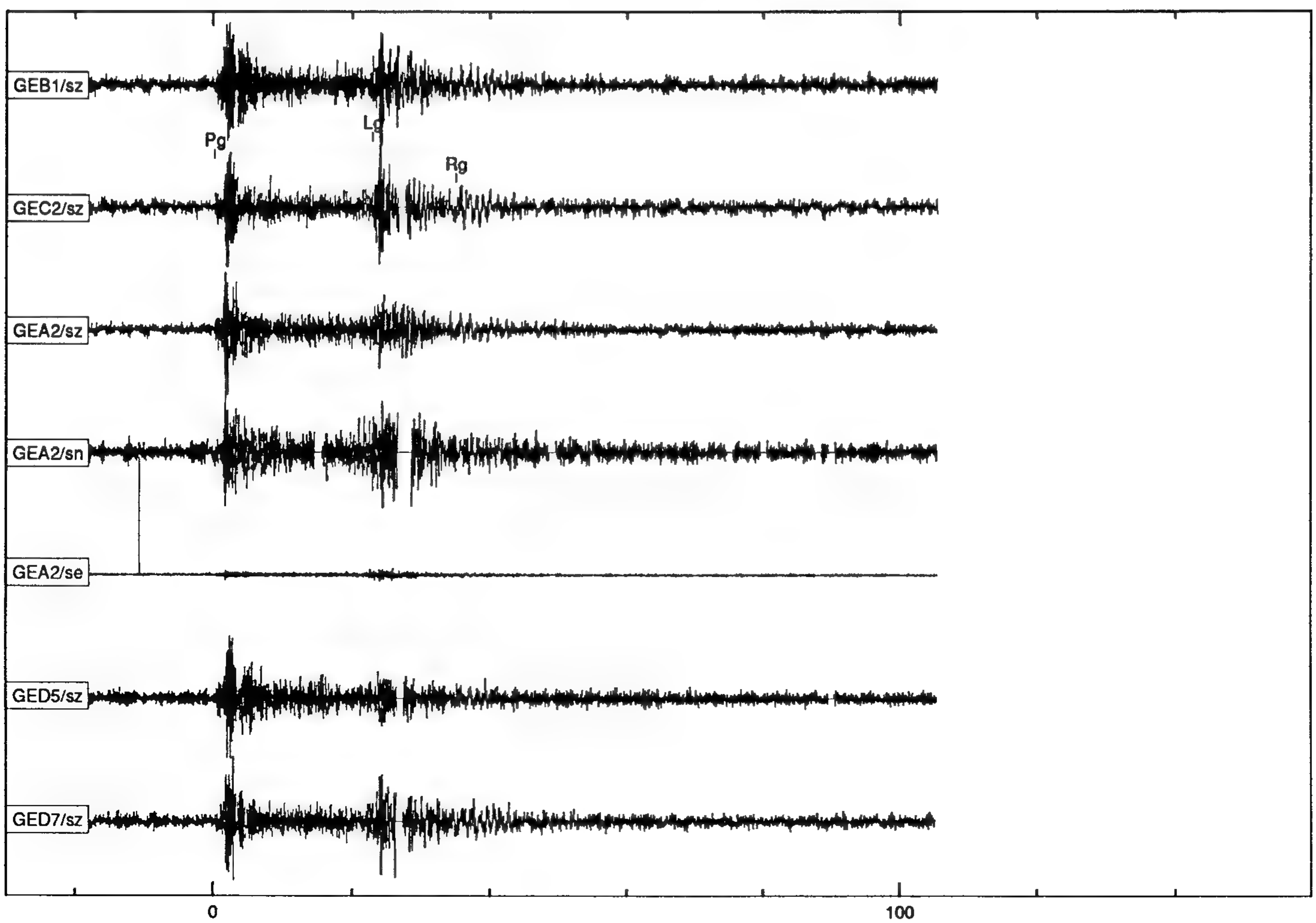
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:46:4.637	337	16.8	27.7	1	0.1	255
Lg	Lg	11:46:27.123	343	25.5	14.6	4	0.3	258
Rg	Rg	11:46:39.362	-1	-1.0	-1.0	-1	-1.0	1469



Array Data

GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
26	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov: (minid=1363)	501
depth	0	501
totcha	2886 kg	501

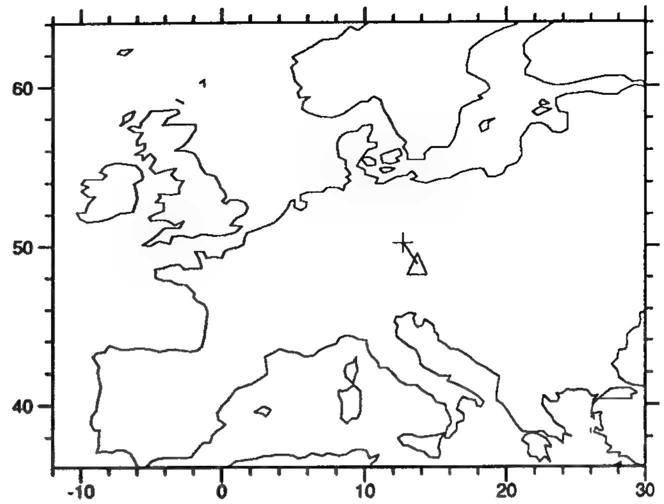
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

Data Set 1, Event 26

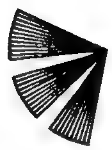
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991173	Jun 22,1991	10:58:34.818	50.2070	12.6850	0.0000	-	-	-	-	2.15	qb	124	FIRBAS

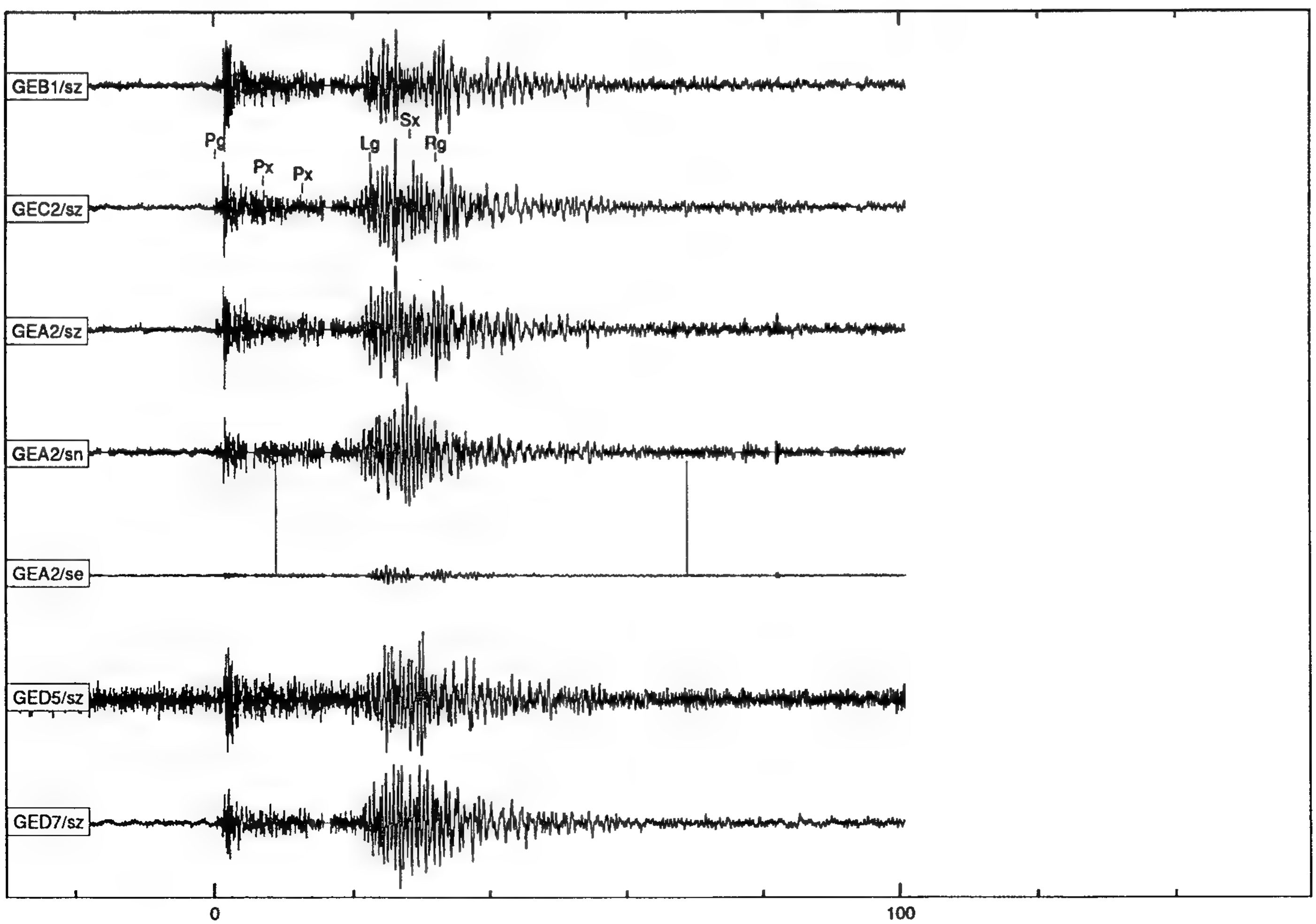
GEC2 1.516 334.47 153.70

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	10:59:3.292	340	13.4	85.0	8	0.3	273
Px	Px	10:59:10.099	341	15.3	8.8	4	0.5	274
Px	Px	10:59:15.748	340	16.5	3.9	5	0.6	275
Lg	Lg	10:59:25.584	341	23.7	18.2	20	0.4	276
Sx	Sx	10:59:31.224	337	30.8	8.7	21	0.5	277
Rg	Rg	10:59:35.167	-1	-1.0	-1.0	-1	-1.0	1470



Array Data GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
27	#1: VOGTLAND	qb

attribute	Ground Truth	
etype	Blast in Vintirov open pit coal mine	501
lat,lon	Vintirov, minid=1363	501
depth	0	501
totcha	3515 kg	501

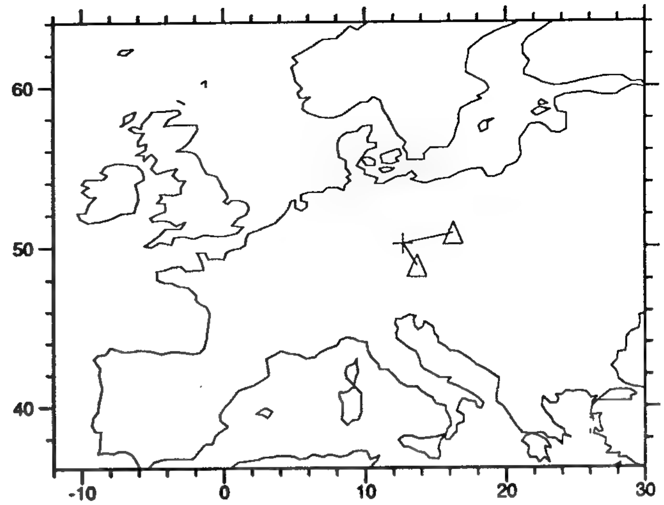
noteid	Notes	refid
1	Origin time derived from GEC2 arrival times	-999
9	Quarry blast identified by Petr Firbas	501

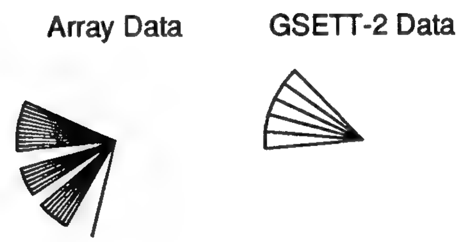
Data Set 1, Event 27

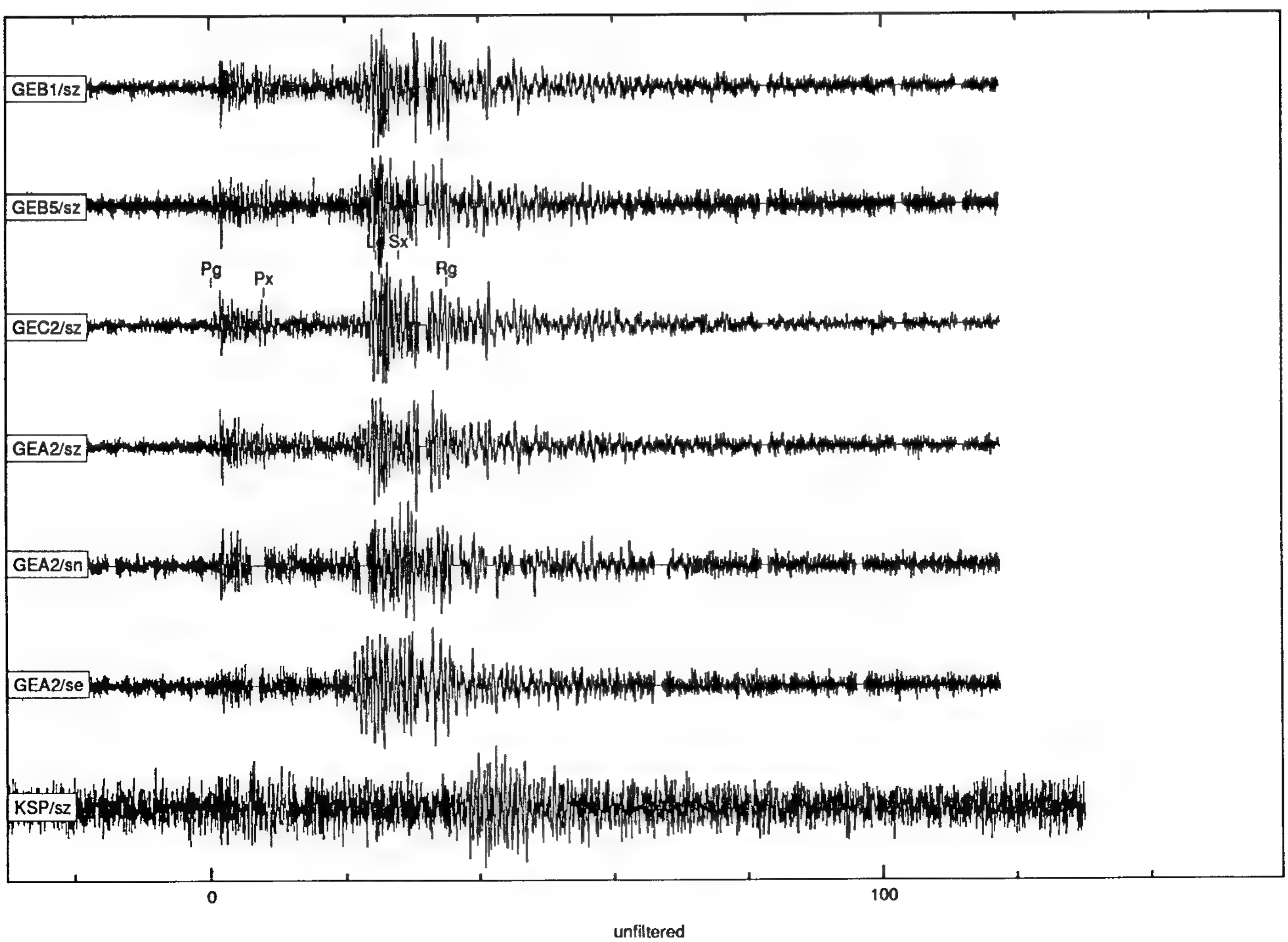
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991178	Jun 27,1991	11:04:39.629	50.2070	12.6850	0.0000	-	-	-	-	1.93	qb	125	FIRBAS

GEC2 1.516 334.47 153.70

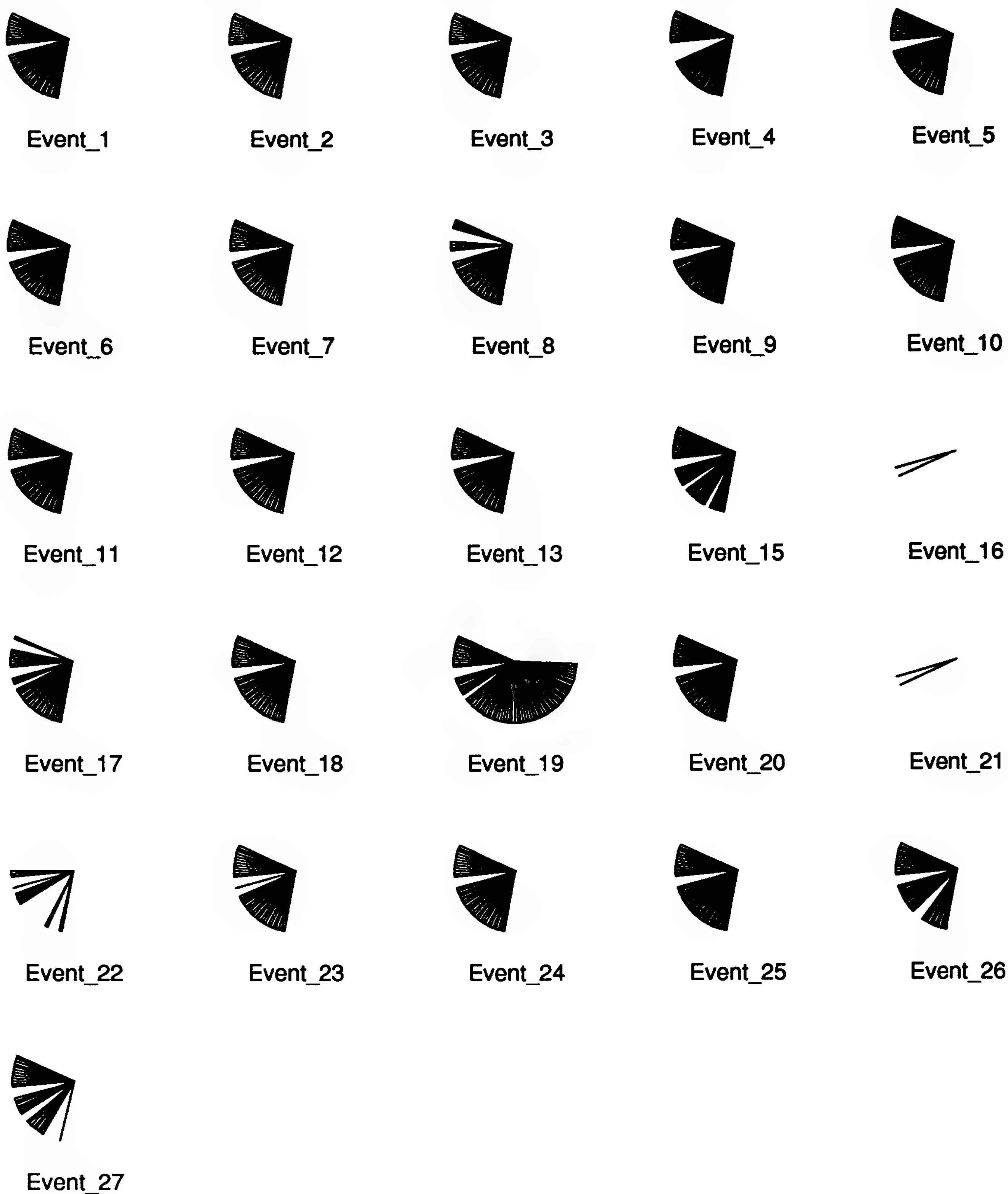
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:05:8.103	335	14.6	20.1	5	0.5	287
Px	Px	11:05:15.774	338	18.0	7.1	5	0.6	288
Lg	Rg	11:05:32.277	336	26.0	9.3	20	0.7	290
Sx	Sx	11:05:35.724	338	28.7	5.8	4	0.5	291
Rg	Lg	11:05:42.949	321	33.5	4.6	8	0.7	292



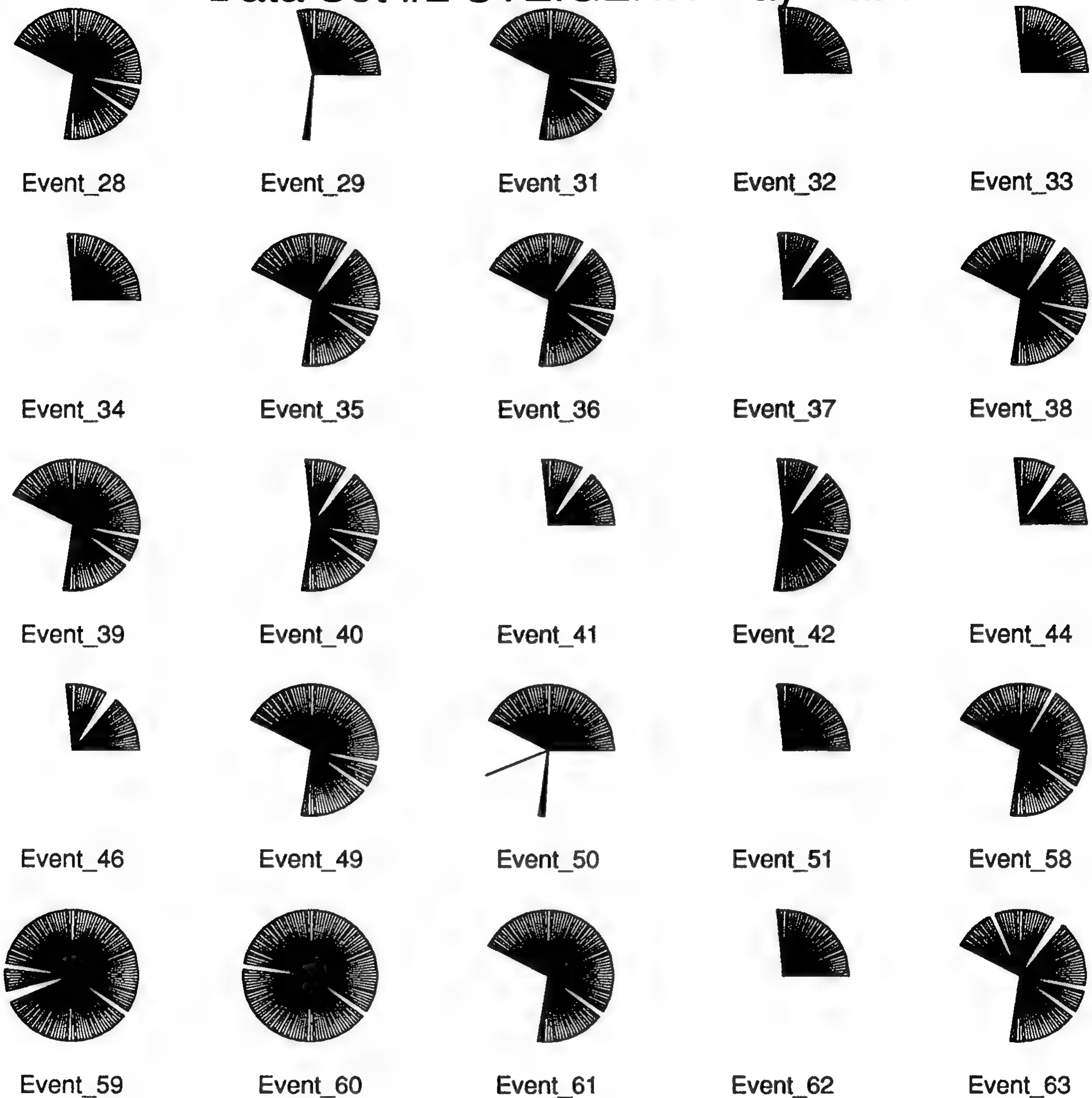




Data Set #1 VOGTLAND: Array Data



Data Set #2 STEIGEN: Array Data



Event Number	Dataset Name	Event Type
28	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
23	Bergen Bulletin, reported as "STEIGEN/NORTH-ERN NORWAY F"	228
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 28

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	8:03:58.100	67.7460	14.8370	12.1000	-	-	-	-	4.50	eq++	248	BERGEN

ARA0 4.295 250.33 60.40

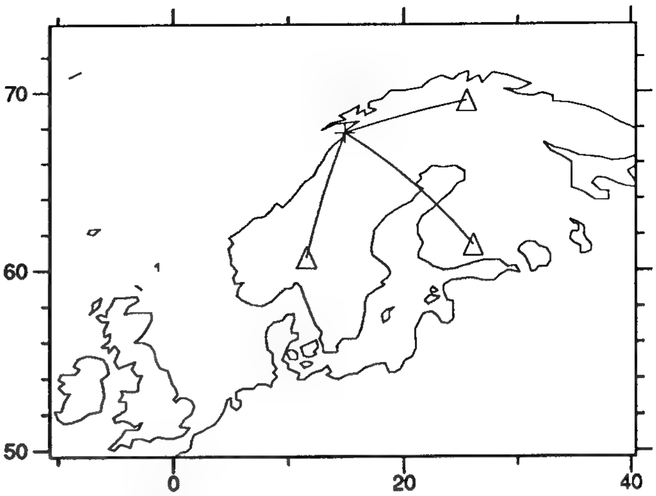
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:05:0.287	242	13.1	321.6	50	0.2	349
Px	Pn	8:05:11.116	238	15.8	40.4	8	0.2	350
Pg	Px	8:05:11.937	244	14.9	14.9	9	0.4	459
Px	Px	8:05:20.566	234	12.0	2.9	24	0.5	460
Px	Px	8:05:41.116	242	18.8	3.0	43	0.6	572
Sn	Sx	8:05:50.687	239	21.2	3.1	68	0.3	353
Sx	Lg	8:05:53.066	235	19.7	3.6	84	0.3	462
Lg	Sx	8:06:9.437	244	27.0	13.3	335	0.5	355
Sx	Sx	8:06:13.891	227	31.5	6.5	42	0.3	465

NRA0 7.183 10.09 193.06

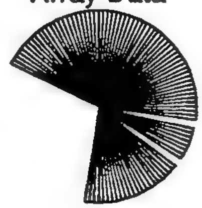
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:05:39.843	[illegible]	13.4	52.5	6	0.2	351
Px	Pn	8:05:47.373	17	15.5	8.6	0	0.1	461
Px	Px	8:05:53.517	12	14.0	2.5	4	0.2	463
Sn	Sn	8:07:0.743	26	24.0	4.8	23	0.4	356
Sx	Sx	8:07:17.318	19	25.2	2.8	23	0.4	358
Sx	Sx	8:07:22.393	12	24.2	2.8	27	0.6	466
Lg	Lg	8:07:39.468	3	27.6	4.5	61	0.5	573
Sx	Lg	8:07:44.793	355	27.1	4.9	17	0.3	359
Sx	Sx	8:07:52.993	5	28.0	2.6	71	0.6	360

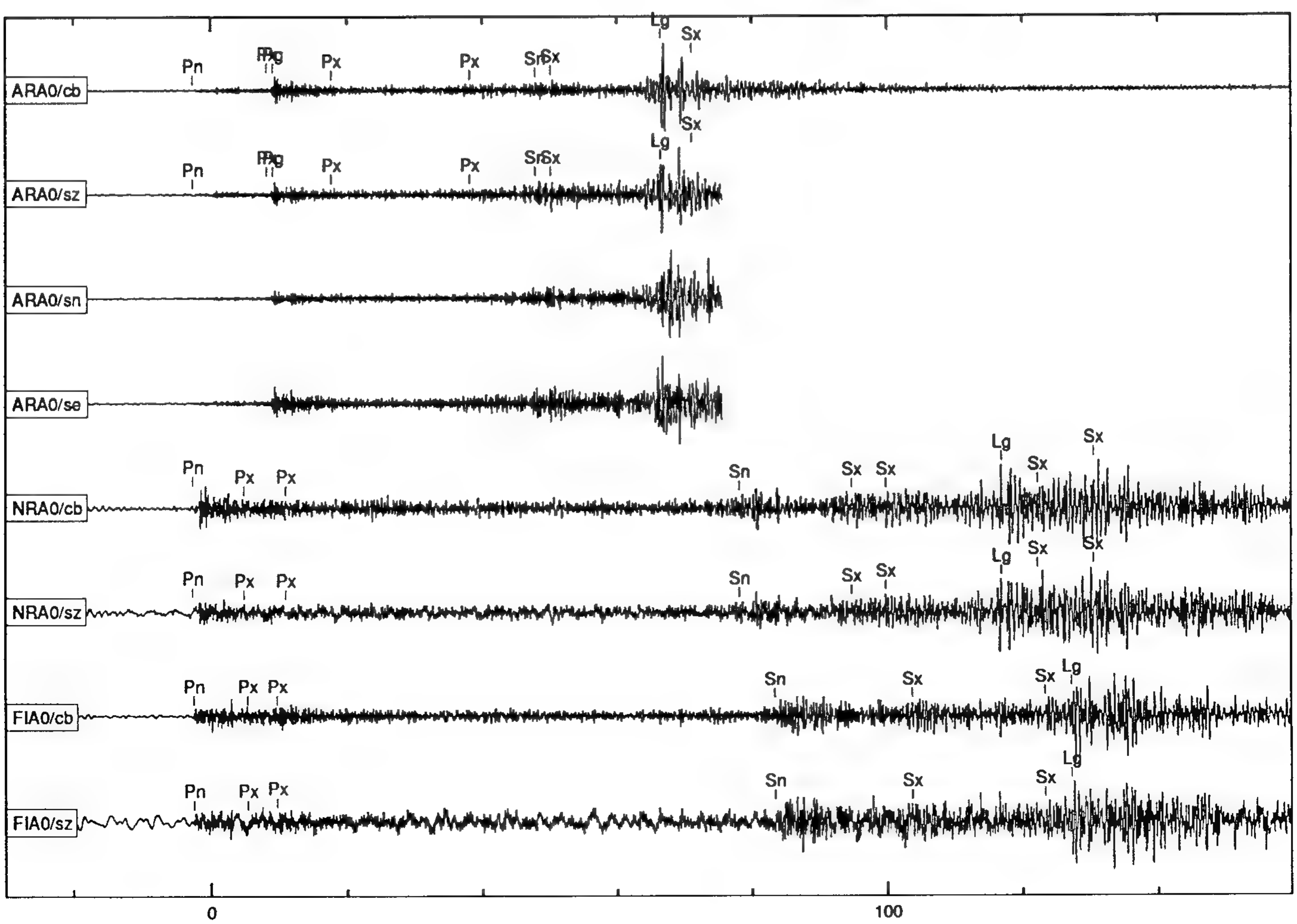
FIA0 7.948 327.52 137.36

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:05:50.483	335	13.2	113.0	6	0.2	352
Px	Px	8:05:58.325	332	11.9	7.2	2	0.2	464
Px	Pg	8:06:2.500	336	12.2	4.9	9	0.3	354
Sn	Lg	8:07:16.375	332	22.1	5.5	17	0.4	357
Sx	Sx	8:07:36.700	337	25.9	2.9	23	0.5	574
Sx	Sx	8:07:56.150	335	24.8	3.7	43	0.5	361
Lg	Lg	8:08:0.008	340	32.6	6.5	77	0.6	575



Array Data





unfiltered

Event Number	Dataset Name	Event Type
29	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

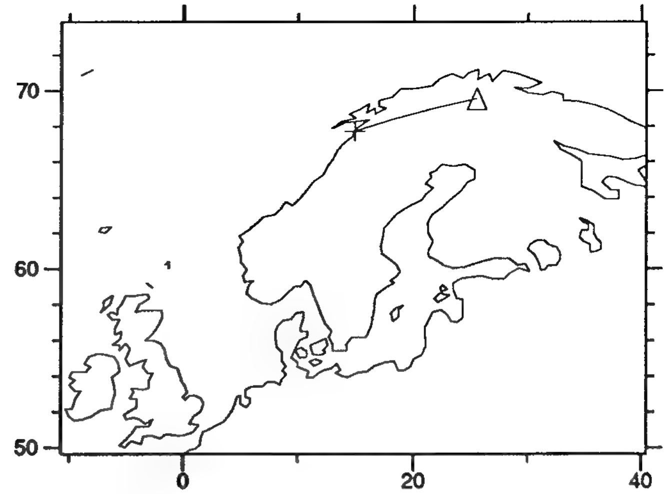
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

Data Set 2, Event 29

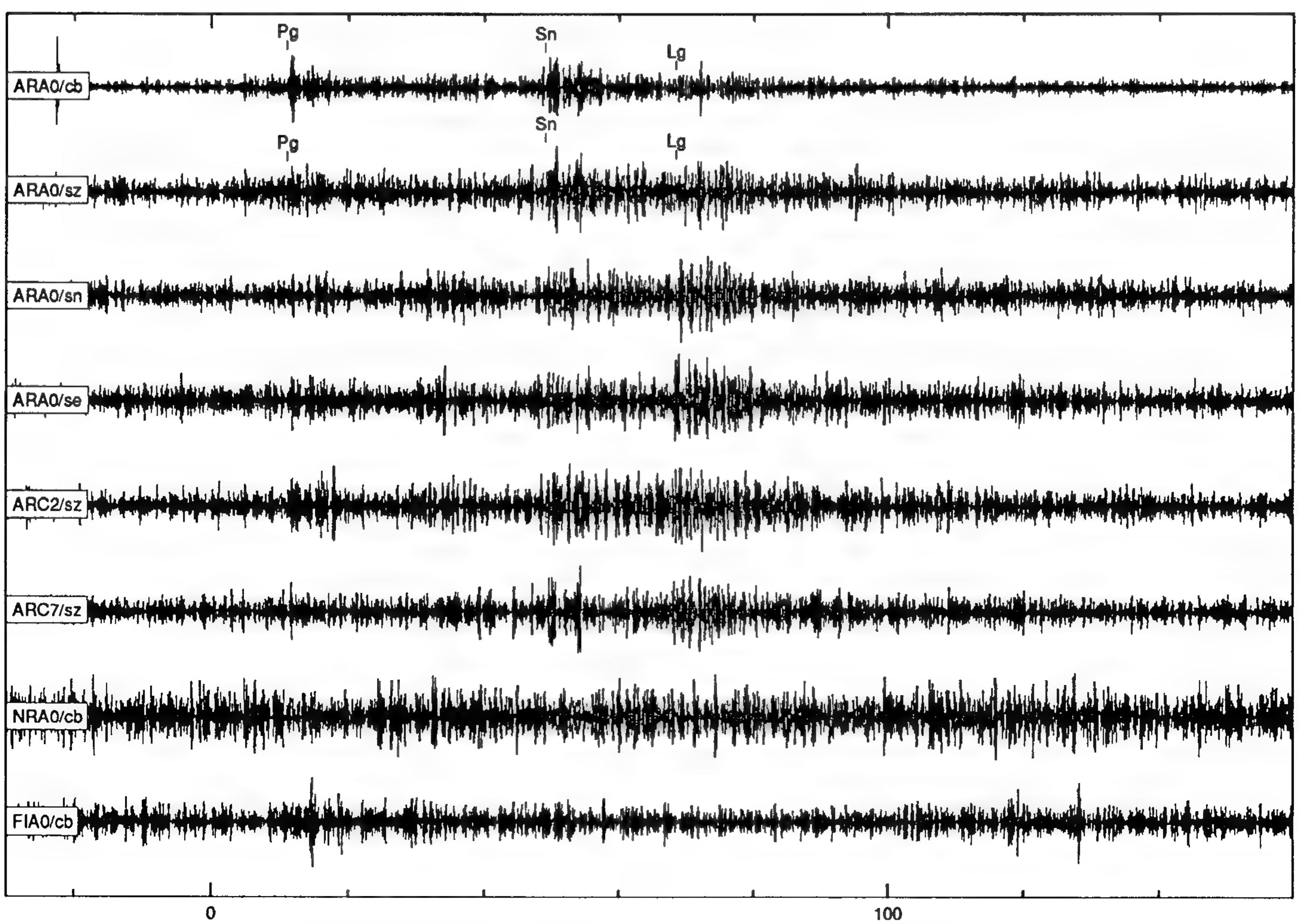
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	8:17:57.825	67.1334	15.8556	0.0000	-	-	-	-	-999.00	eq+	249	ARS:flori

ARA0 4.313 240.59 51.62

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	8:19:15.178	240	15.3	5.1	0	0.2	467
Sn	Sn	8:19:53.128	-1	-1.0	-1.0	-1	-1.0	1478
Lg	Sn	8:20:12.528	241	20.8	4.2	0	0.2	468



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
31	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	228
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 31

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	8:39:1.800	67.7210	14.8470	12.1000	-	-	-	-	1.60	eq++	250	BERGEN

ARA0 4.304 250.01 60.09

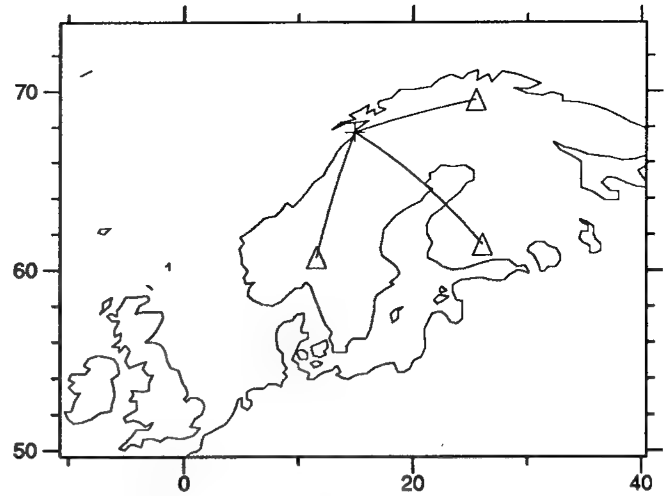
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:40:4.223	240	12.3	43.4	1	0.1	362
Px	Px	8:40:14.809	239	15.8	16.1	2	0.2	363
Pg	Pg	8:40:15.648	242	15.3	8.5	1	0.3	475
Px	Px	8:40:23.034	242	14.4	2.4	1	0.2	476
Sn	Sx	8:40:54.673	239	20.1	6.6	1	0.1	365
Sx	Sx	8:41:0.340	239	23.2	2.9	2	0.1	366
Lg	Sx	8:41:13.373	240	24.4	10.7	20	0.4	367
Sx	Lg	8:41:17.660	230	27.0	4.2	2	0.2	368

NRA0 7.160 10.16 193.14

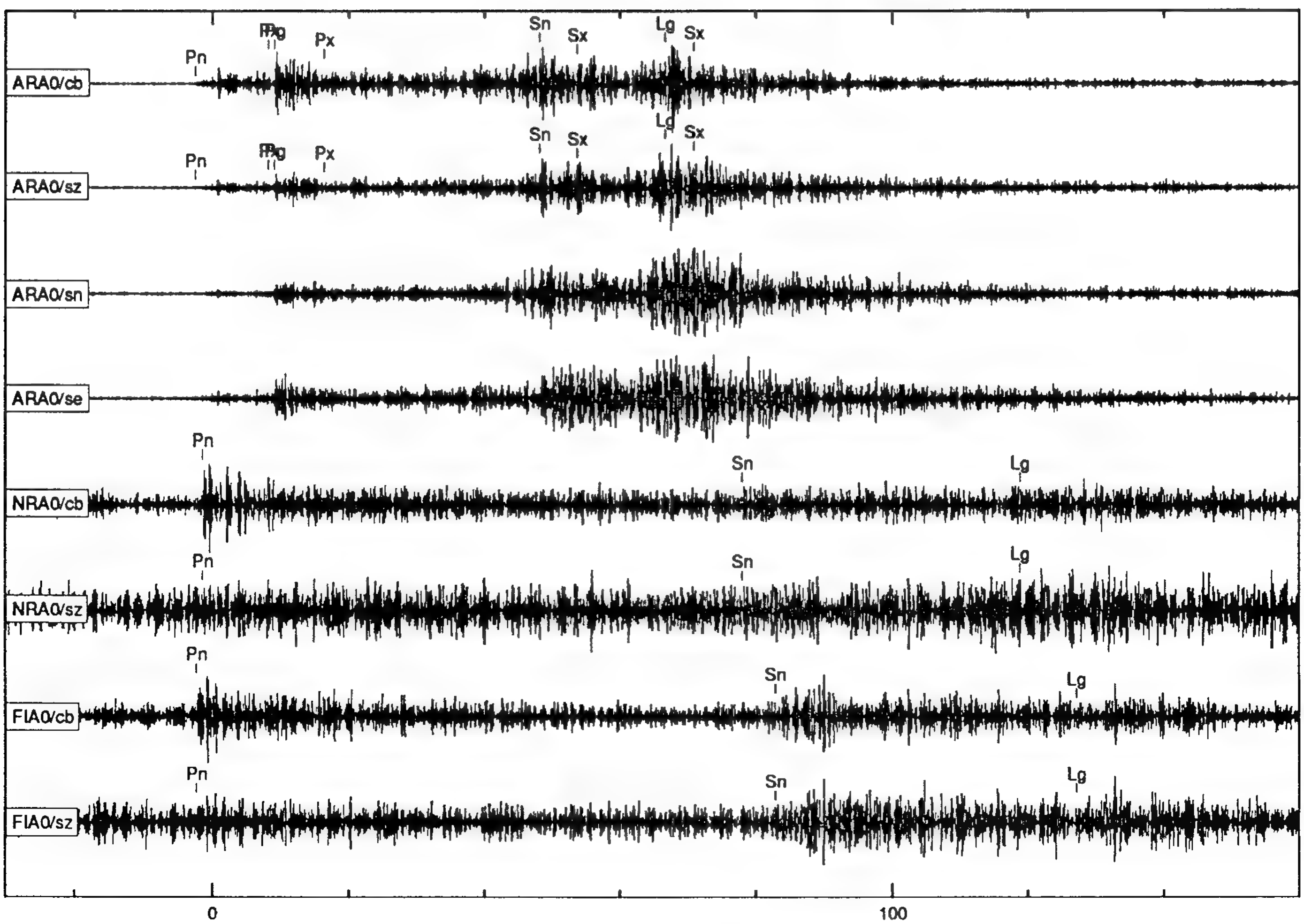
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:40:44.361	7	12.2	4.9	0	0.2	364
Sn	Sn	8:42:3.861	-1	-1.0	-1.0	-1	-1.0	1479
Lg	Lg	8:42:44.486	-1	-1.0	-1.0	-1	-1.0	1480

FIA0 7.927 327.42 137.27

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	P	8:40:53.993	307	2.4	5.4	0	0.2	477
Sn	Sn	8:42:19.087	-1	-1.0	-1.0	-1	-1.0	1481
Lg	Sx	8:43:3.368	325	25.8	4.0	1	0.3	369



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
32	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

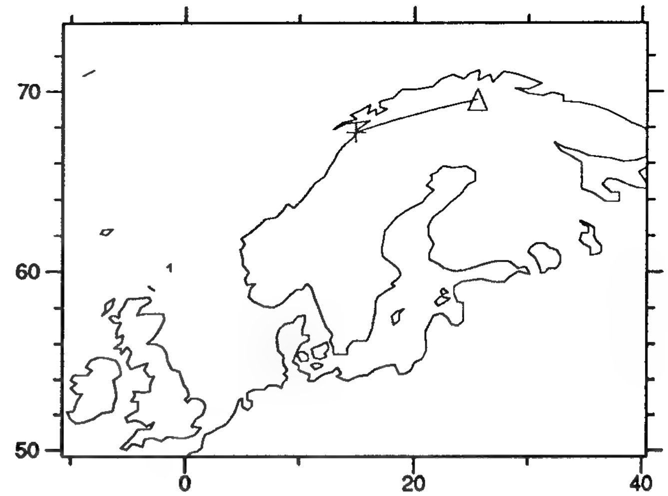
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

Data Set 2, Event 32

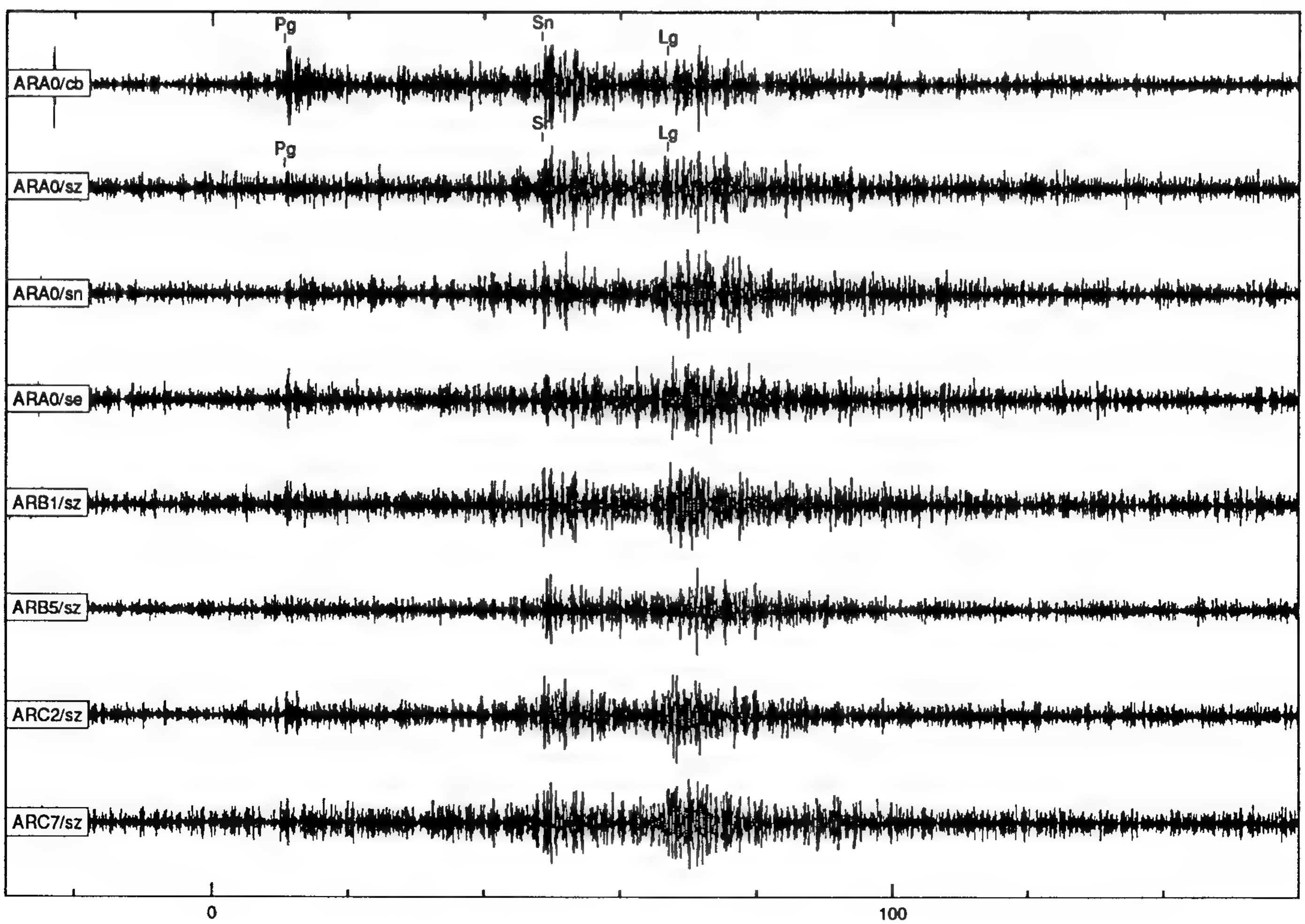
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	8:57:3.732	67.2118	15.9492	0.0000	-	-	-	-	-999.00	eq+	251	ARS:flori

ARA0 4.236 241.12 52.24

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	8:58:19.524	241	15.1	5.0	0	0.2	478
Sn	Sn	8:58:57.445	-1	-1.0	-1.0	-1	-1.0	1482
Lg	Sn	8:59:15.846	247	23.4	4.7	0	0.3	[illegible]



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
33	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

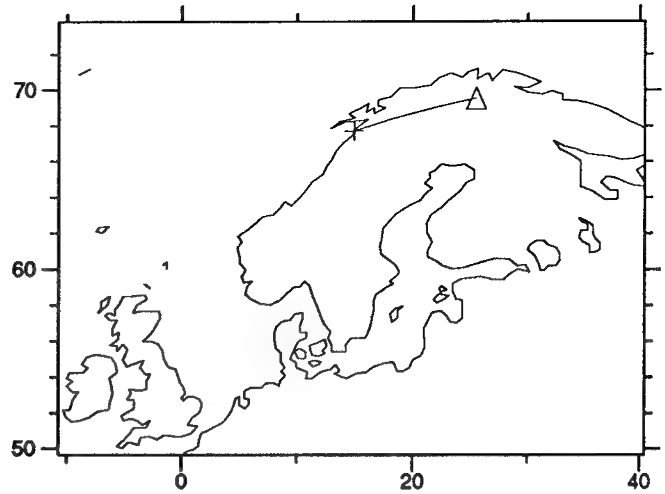
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212

Data Set 2, Event 33

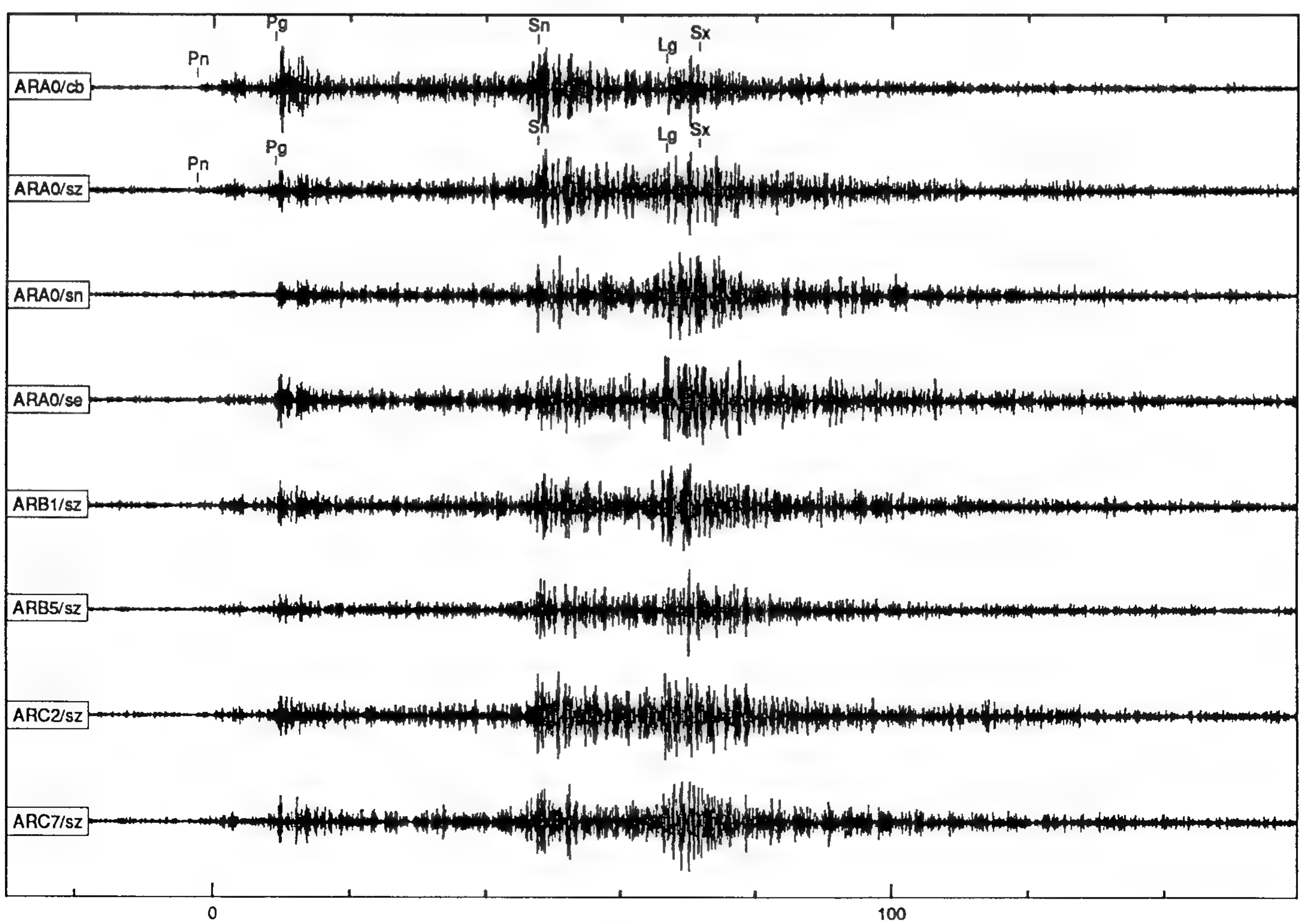
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	10:15:11.600	67.7230	14.8820	12.3000	-	-	-	-	2.00	eq+	252	BERGEN

ARA0 4.291 249.95 60.06

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	10:16:13.934	235	11.1	8.8	0	0.1	484
Pg	Px	10:16:25.360	238	15.7	18.9	2	0.2	485
Sn	Sx	10:17:3.934	244	21.4	3.6	2	0.2	486
Lg	Sx	10:17:22.859	241	23.5	12.6	5	0.4	487
Sx	Lg	10:17:27.909	231	27.1	4.5	1	0.3	488



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
34	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

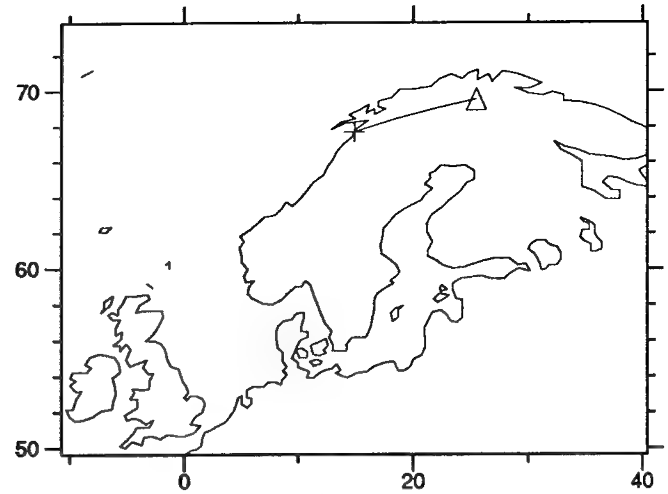
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

Data Set 2, Event 34

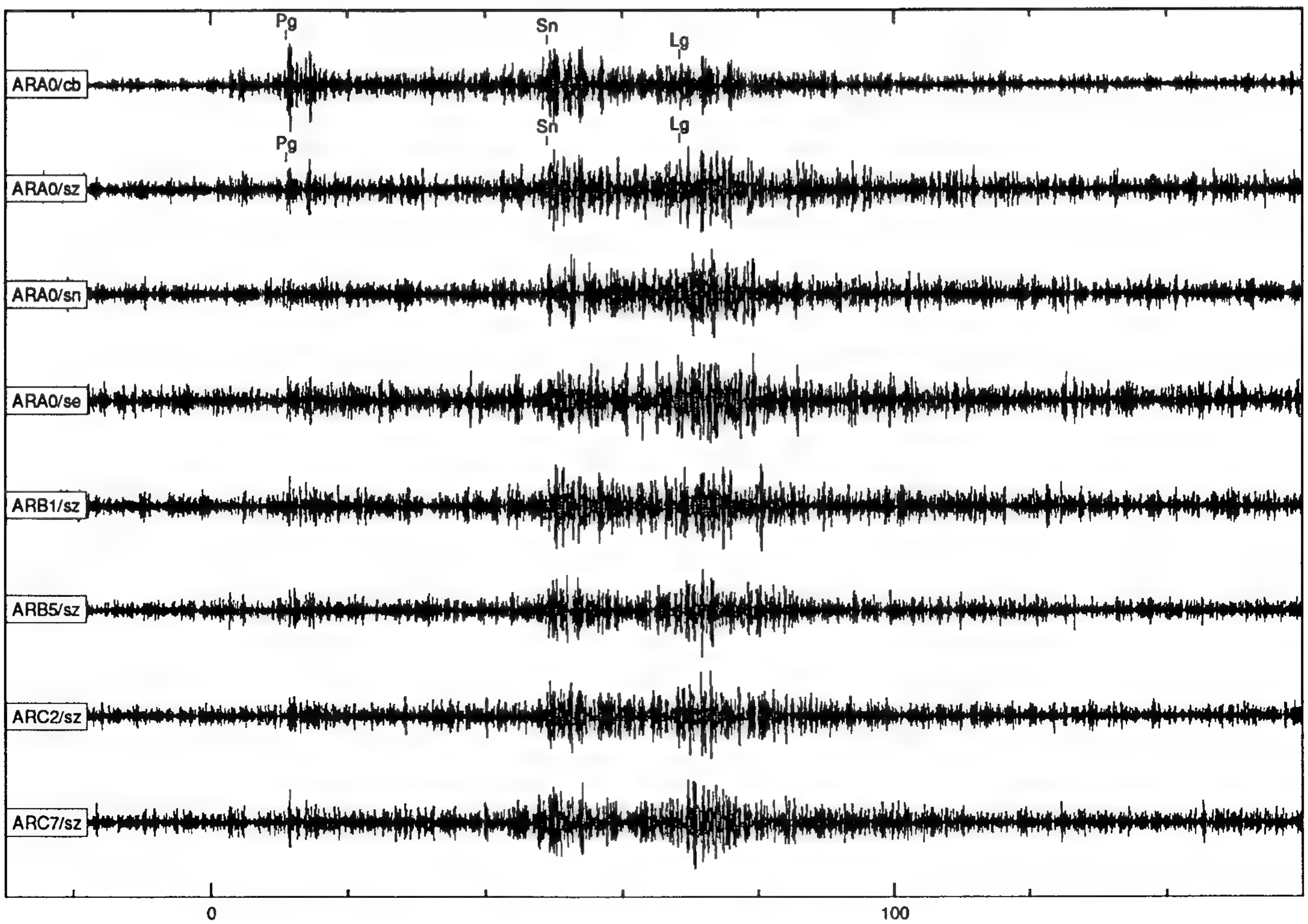
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992001	Jan 1,1992	14:46:6.865	67.0368	16.0349	0.0000	-	-	-	-	-999.00	eq+	253	ARS:flori

ARA0 4.320 239.00 50.21

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	14:47:24.212	239	15.4	6.9	0	0.2	489
Sn	Sx	14:48:2.208	230	23.4	3.6	0	0.1	490
Lg	Lg	14:48:21.689	250	23.6	5.4	1	0.3	491



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
35	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 35

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992004	Jan 4,1992	3:43:43.400	67.7070	14.9330	0.0000	–	–	–	–	2.00	eq+	254	BERGEN

ARA0 4.283 249.63 59.79

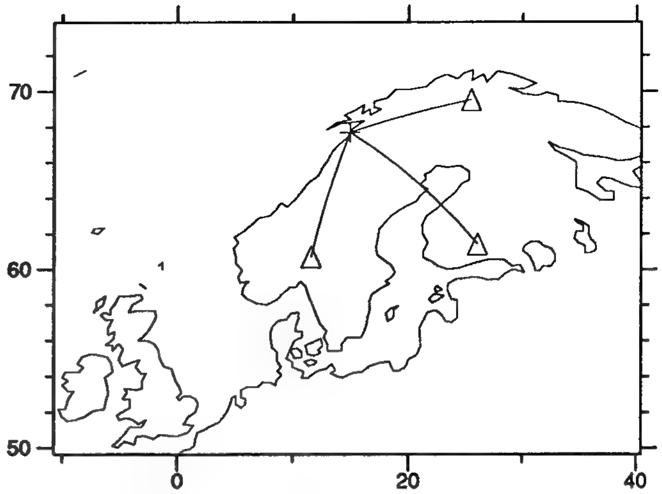
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:44:46.392	234	11.2	25.6	1	0.1	381
Pg	Px	3:44:57.874	237	15.4	7.6	2	0.2	382
Px	Px	3:45:4.850	227	14.8	2.5	1	0.2	383
Sn	Sx	3:45:35.903	247	21.6	4.0	4	0.1	385
Lg	Sx	3:45:55.198	243	24.2	5.9	20	0.4	386

NRA0 7.153 10.44 193.50

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:45:26.766	354	8.8	5.9	0	0.1	384
Lg	Lg	3:47:26.772	-1	-1.0	-1.0	-1	-1.0	1483

FIA0 7.894 327.53 137.45

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	P	3:45:36.204	71	1.1	6.3	0	0.1	496
Lg	Lg	3:47:48.821	39	1.2	7.4	2	0.4	592
Sx	P	3:47:54.725	87	6.6	4.2	2	0.4	498



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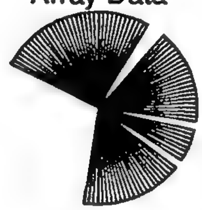
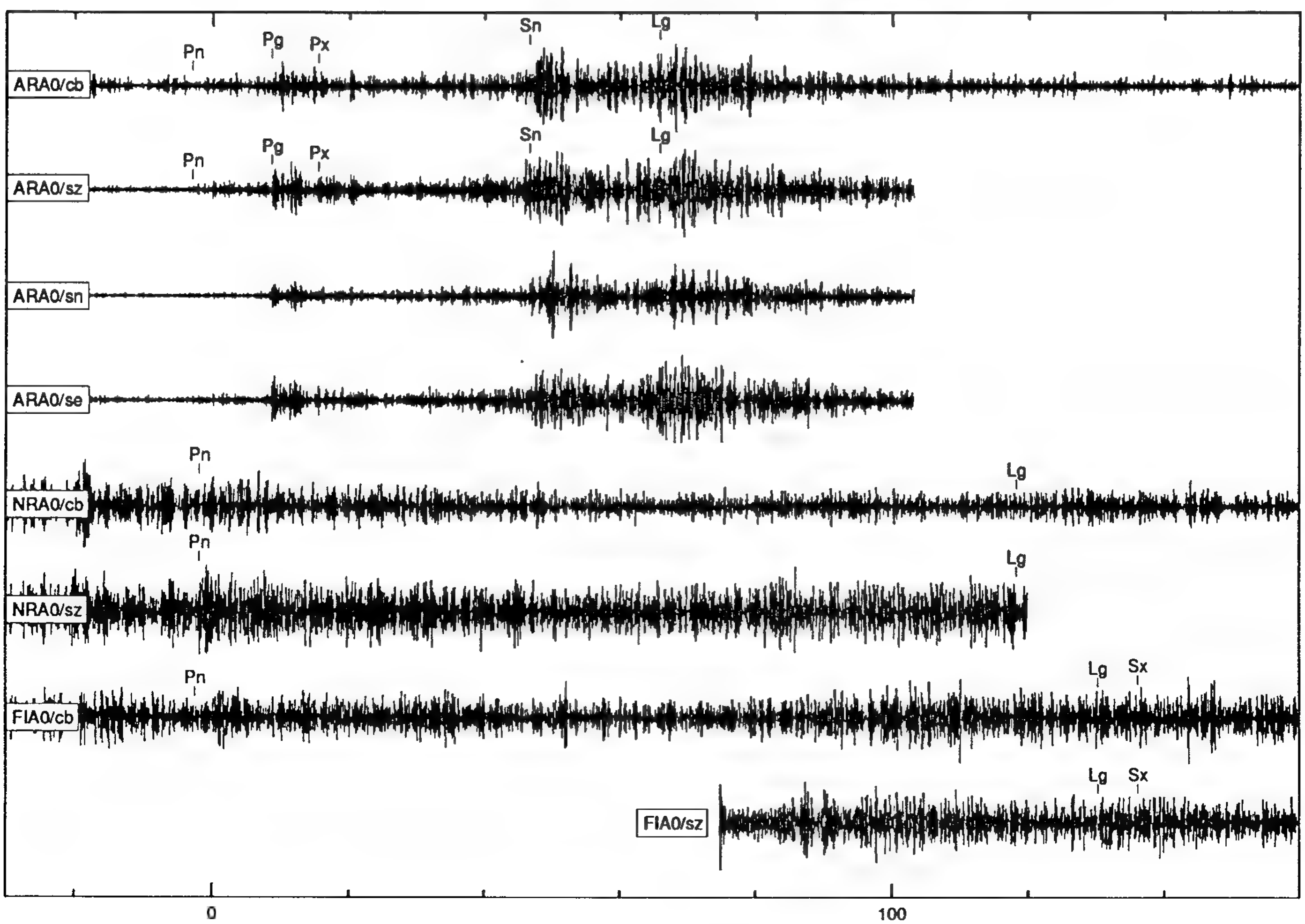




filtered 4-8 Hz

Event Number	Dataset Name	Event Type
36	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 36

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992004	Jan 4,1992	4:15:4.000	67.7080	14.8980	12.1000	-	-	-	-	3.60	eq++	256	BERGEN

ARA0 4.294 249.73 59.86

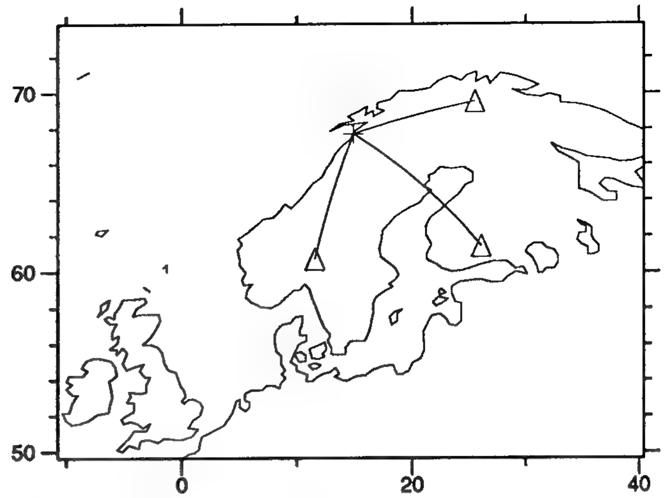
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:16:6.471	244	13.3	163.3	8	0.2	387
Pg	Px	4:16:18.271	239	15.5	41.7	4	0.2	500
Px	Pg	4:16:19.041	238	15.1	14.4	2	0.3	388
Px	Px	4:16:26.691	235	13.8	3.0	6	0.4	501
Sx	Sx	4:16:46.716	241	21.3	2.6	9	0.5	502
Sn	Sx	4:16:55.362	235	23.2	3.4	5	0.1	392
Sx	Sx	4:17:3.741	239	20.2	2.7	14	0.2	393
Lg	Sx	4:17:15.571	246	27.8	14.8	101	0.5	395
Sx	Lg	4:17:19.966	234	30.4	5.6	14	0.4	503

NRA0 7.151 10.34 193.36

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:16:46.571	8	13.4	22.3	2	0.2	389
Px	Px	4:16:53.333	17	13.8	4.4	1	0.2	390
Sn	Sn	4:18:5.796	25	23.4	4.5	6	0.4	396
Sx	Sx	4:18:13.008	29	24.8	2.5	3	0.4	504
Sx	Sx	4:18:23.658	16	23.3	2.7	6	0.4	398
Sx	Sx	4:18:40.283	7	28.1	3.2	11	0.5	399
Lg	Lg	4:18:45.521	359	30.3	4.5	3	0.4	400
Sx	Sx	4:18:54.433	28	25.4	2.4	4	0.2	505

FIA0 7.904 327.46 137.35

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:16:56.627	339	13.9	27.0	2	0.2	391
Px	Px	4:17:8.500	331	11.6	3.2	2	0.3	394
Sn	Lg	4:18:21.242	335	22.8	3.0	2	0.2	397
Sx	Sx	4:19:2.350	334	23.7	3.6	10	0.5	401
Lg	Lg	4:19:7.002	336	31.0	4.6	14	0.5	402



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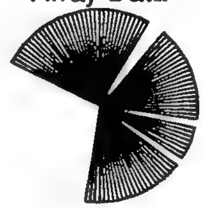
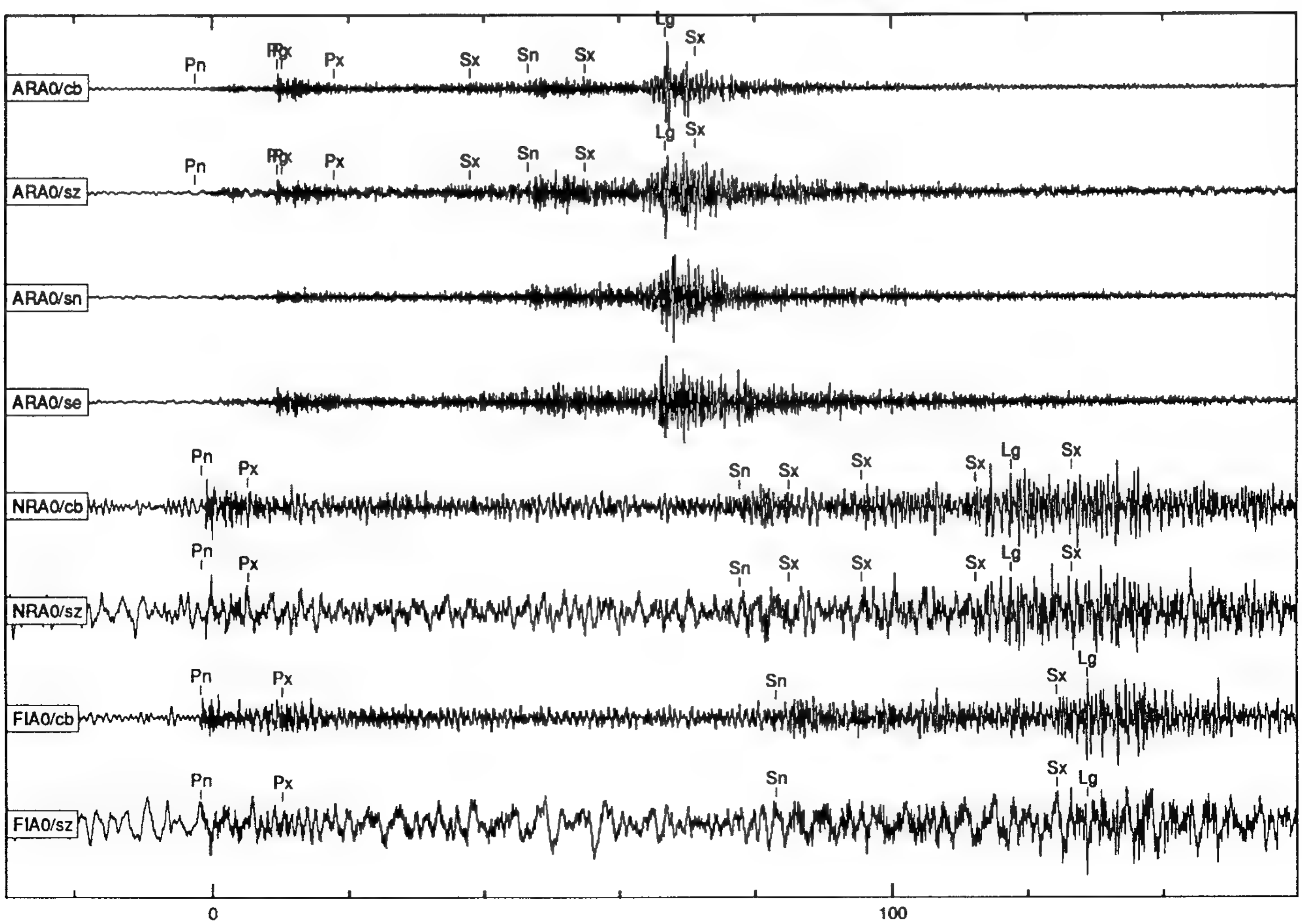




unfiltered

Event Number	Dataset Name	Event Type
37	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

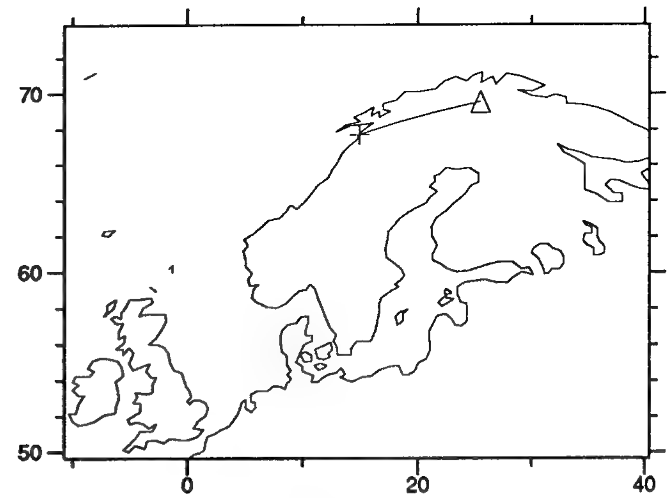
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 37

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992004	Jan 4,1992	5:33:26.500	67.6810	14.8650	12.1000	-	-	-	-	0.50	eq+	257	BERGEN

ARA0 4.318 249.51 59.60

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Px	Pn	5:34:31.844	236	10.8	7.1	0	0.1	403
Pg	Px	5:34:40.944	240	15.5	5.5	0	0.2	404
Sn	Sx	5:35:19.110	238	20.0	2.9	0	0.1	405
Lg	Sx	5:35:38.394	233	31.9	3.8	1	0.2	406



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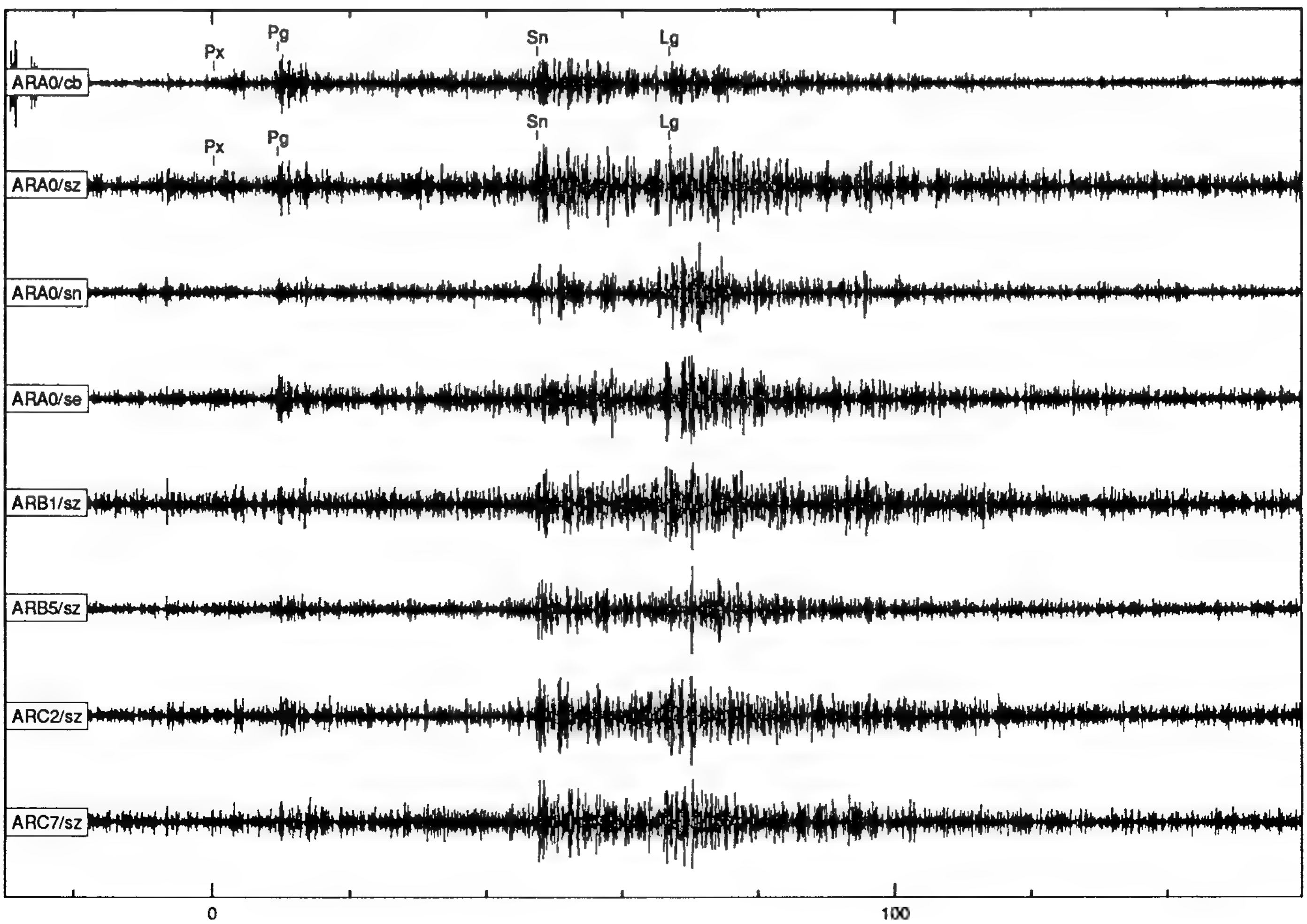


filtered 4-8 Hz

Event Number	Dataset Name	Event Type
38	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 38

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992004	Jan 4,1992	6:00:53.100	67.6980	14.8680	12.1000	-	-	-	-	5.50	eq++	258	BERGEN

ARA0 4.309 249.69 59.79

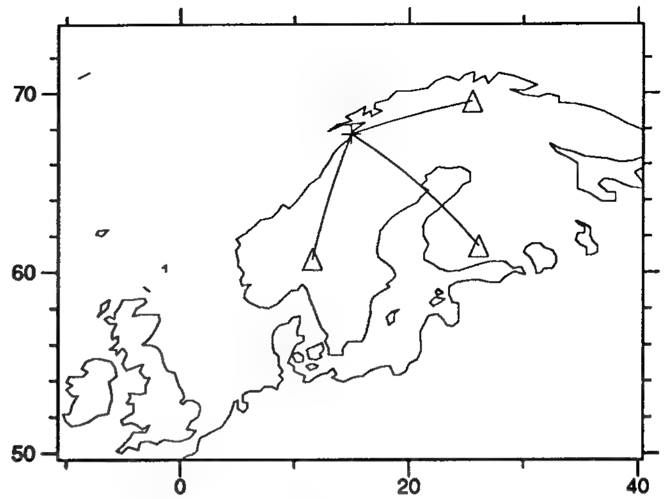
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:01:55.642	245	13.0	360.9	60	0.2	407
Px	Px	6:02:10.158	238	15.3	11.4	11	0.2	408
Px	Px	6:02:15.145	240	16.9	3.3	32	0.6	409
Sx	Pn	6:02:36.620	241	18.9	3.4	60	0.6	605
Sn	Sx	6:02:45.570	238	20.5	3.8	83	0.2	412
Sx	Lg	6:02:53.520	242	22.1	2.5	85	0.3	413
Lg	Sx	6:03:4.667	249	30.1	16.8	489	0.5	606
Sx	Sx	6:03:8.746	230	30.8	5.6	61	0.3	415

NRA0 7.139 10.27 193.26

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:02:35.333	6	13.3	161.7	8	0.2	410
Px	Pn	6:02:41.608	17	13.5	8.1	1	0.3	507
Px	Px	6:02:48.483	10	14.2	2.9	6	0.2	508
Px	Pn	6:03:2.333	18	13.2	2.5	9	0.4	509
Sn	Lg	6:03:55.390	24	23.6	6.2	33	0.4	416
Sx	Lg	6:04:10.708	4	24.1	3.0	28	0.7	510
Sx	Sx	6:04:30.208	11	26.9	3.5	57	0.7	511
Lg	Sx	6:04:36.590	2	31.6	3.7	59	0.6	419
Sx	Sx	6:04:48.058	3	27.2	4.0	121	0.7	420

FIA0 7.904 327.35 137.22

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:02:45.500	329	11.8	246.6	12	0.2	411
Px	Px	6:02:55.225	329	11.5	4.1	9	0.3	414
Sn	Sn	6:04:10.033	341	22.7	4.1	22	0.3	417
Sx	Sx	6:04:19.500	341	27.2	2.5	19	0.3	418
Lg	Lg	6:04:57.053	339	32.0	6.3	89	0.6	607
Sx	Sx	6:04:59.425	328	27.5	4.3	88	0.6	421



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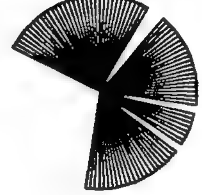
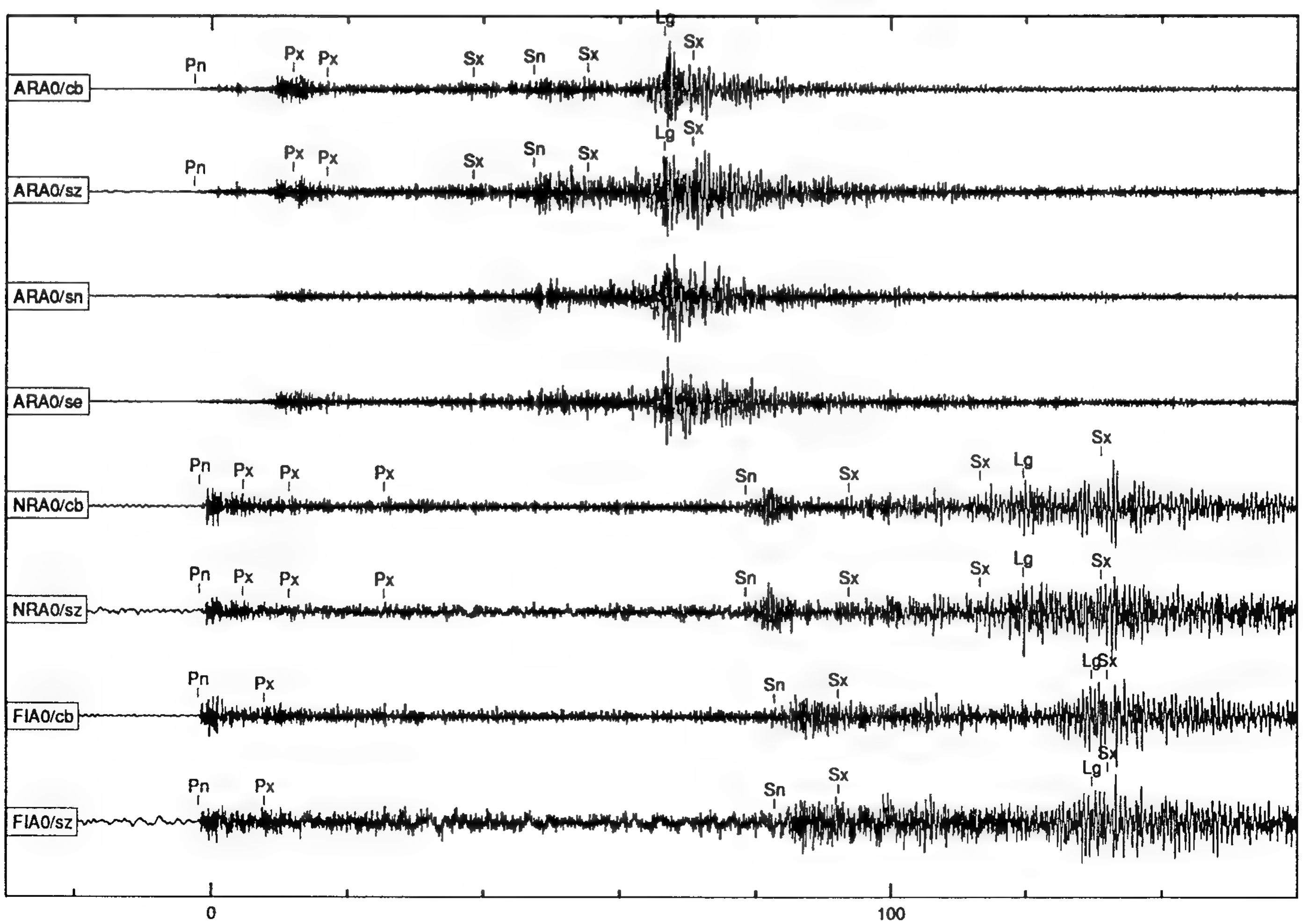




unfiltered

Event Number	Dataset Name	Event Type
39	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 39

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992004	Jan 4,1992	9:06:31.200	67.7550	14.9180	12.1000	-	-	-	-	2.50	eq++	259	BERGEN

ARA0 4.263 250.23 60.37

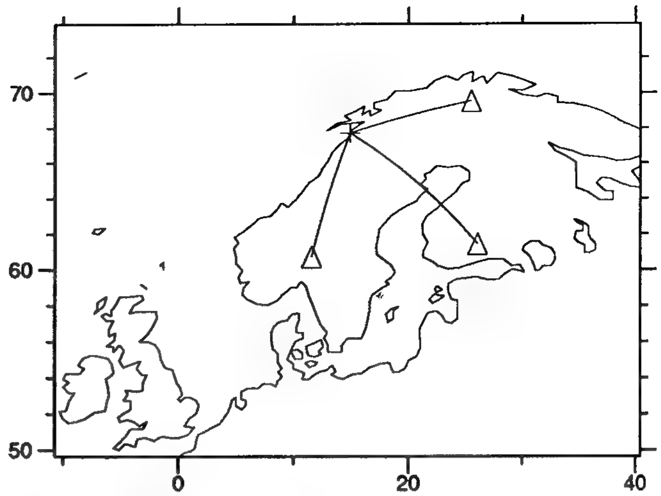
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	9:07:33.131	240	12.1	41.6	4	0.1	422
Px	Px	9:07:44.365	237	15.9	29.6	2	0.2	513
Pg	Px	9:07:44.796	241	14.8	13.2	2	0.3	423
Sn	Sx	9:08:23.242	255	25.2	3.6	3	0.1	427
Sx	Sx	9:08:31.022	225	21.3	2.6	3	0.1	610
Lg	Sx	9:08:42.049	248	27.4	16.7	54	0.5	428
Sx	Sn	9:08:47.566	238	24.5	5.2	7	0.4	514

NRA0 7.199 10.31 193.35

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	9:08:13.053	7	13.2	15.8	1	0.2	424
Px	Px	9:08:19.928	13	13.2	4.3	0	0.2	425
Sn	Sn	9:09:34.880	14	21.2	3.0	2	0.2	429
Lg	Lg	9:10:12.178	-1	-1.0	-1.0	-1	-1.0	1484
Sx	Sx	9:10:21.503	9	25.9	2.5	4	0.3	431

FIA0 7.934 327.73 137.64

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	9:08:23.092	327	11.1	16.7	1	0.2	426
Sn	Sn	9:09:47.283	340	24.0	3.3	2	0.3	430
Sx	Sx	9:10:28.950	333	21.9	3.3	6	0.5	611
Sx	Sx	9:10:31.675	334	29.5	3.6	6	0.5	612
Lg	Sx	9:10:35.717	326	25.9	3.4	7	0.5	432



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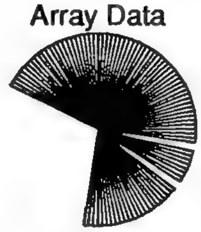
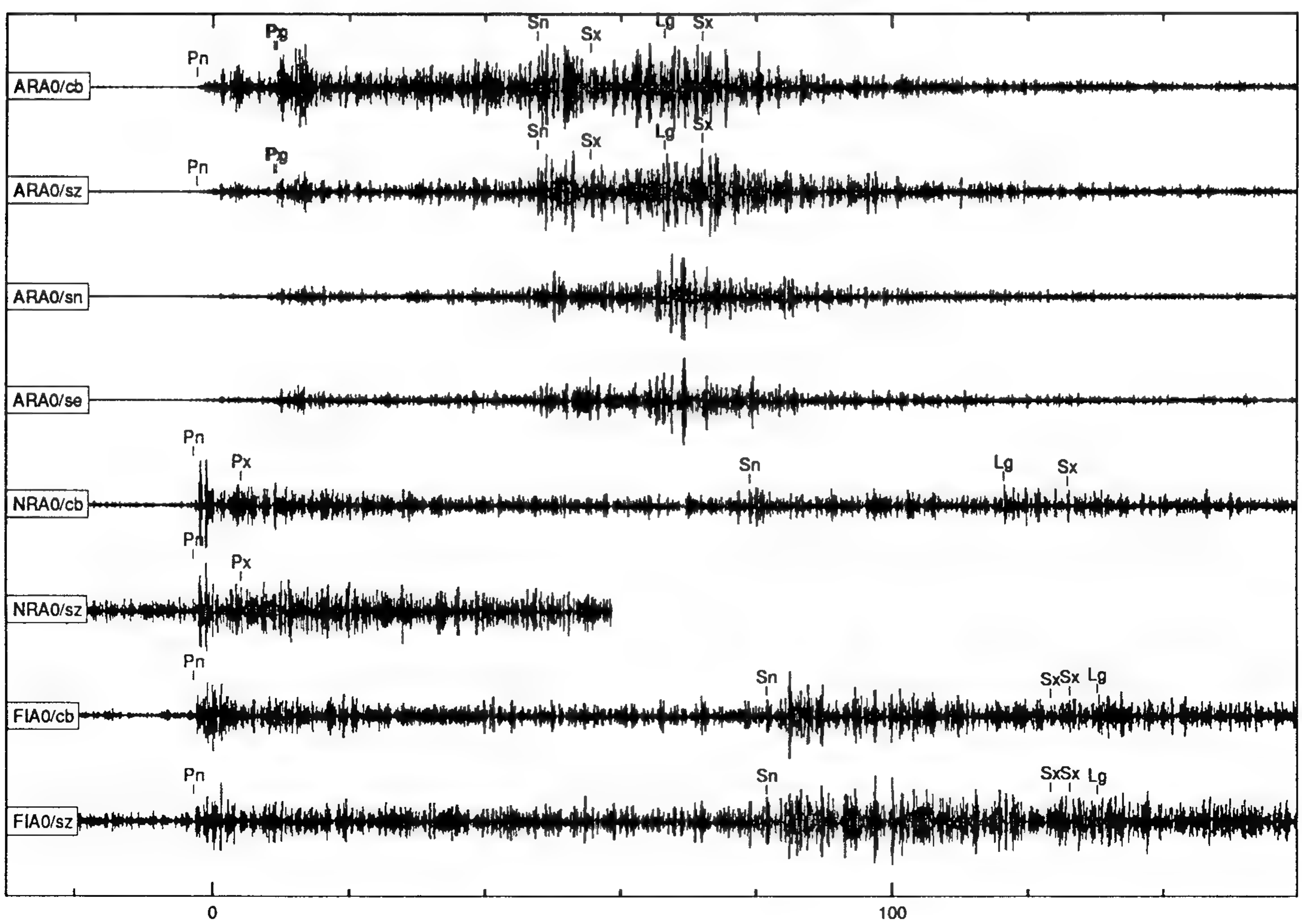




filtered 4-8 Hz

Event Number	Dataset Name	Event Type
40	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 40

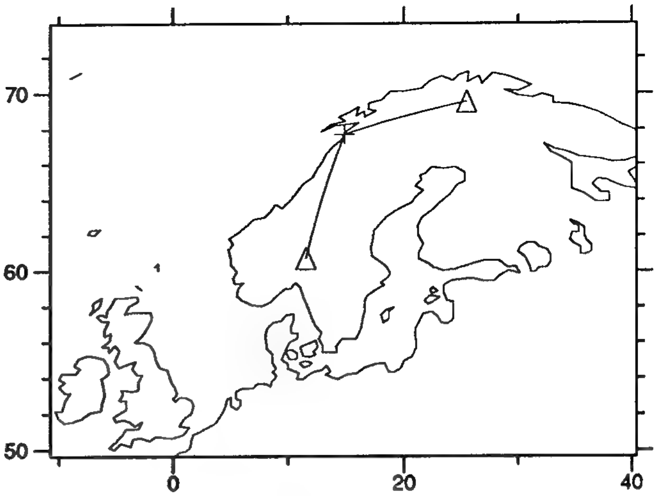
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992005	Jan 5,1992	1:20:49.900	67.7290	14.7750	15.5000	-	-	-	-	1.70	eq+	261	BERGEN

ARA0 4.324 250.29 60.30

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	1:21:51.425	233	11.0	20.9	0	0.1	433
Pg	Px	1:22:3.076	240	15.7	13.9	0	0.2	434
Px	Px	1:22:6.390	237	15.4	6.2	0	0.3	435
Sn	Sx	1:22:40.875	242	21.9	3.5	2	0.2	438
Lg	Lg	1:23:0.350	248	26.3	12.1	14	0.4	439
Sx	Sx	1:23:4.890	231	26.6	4.8	2	0.3	515

NRA0 7.161 9.93 192.85

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	P	1:22:31.415	310	3.6	5.6	0	0.3	436
Px	Pn	1:22:35.184	10	13.7	3.6	0	0.2	437
Sn	Sn	1:23:51.228	-1	-1.0	-1.0	-1	-1.0	1487
Lg	Lg	1:24:30.190	-1	-1.0	-1.0	-1	-1.0	1486



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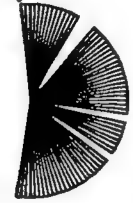
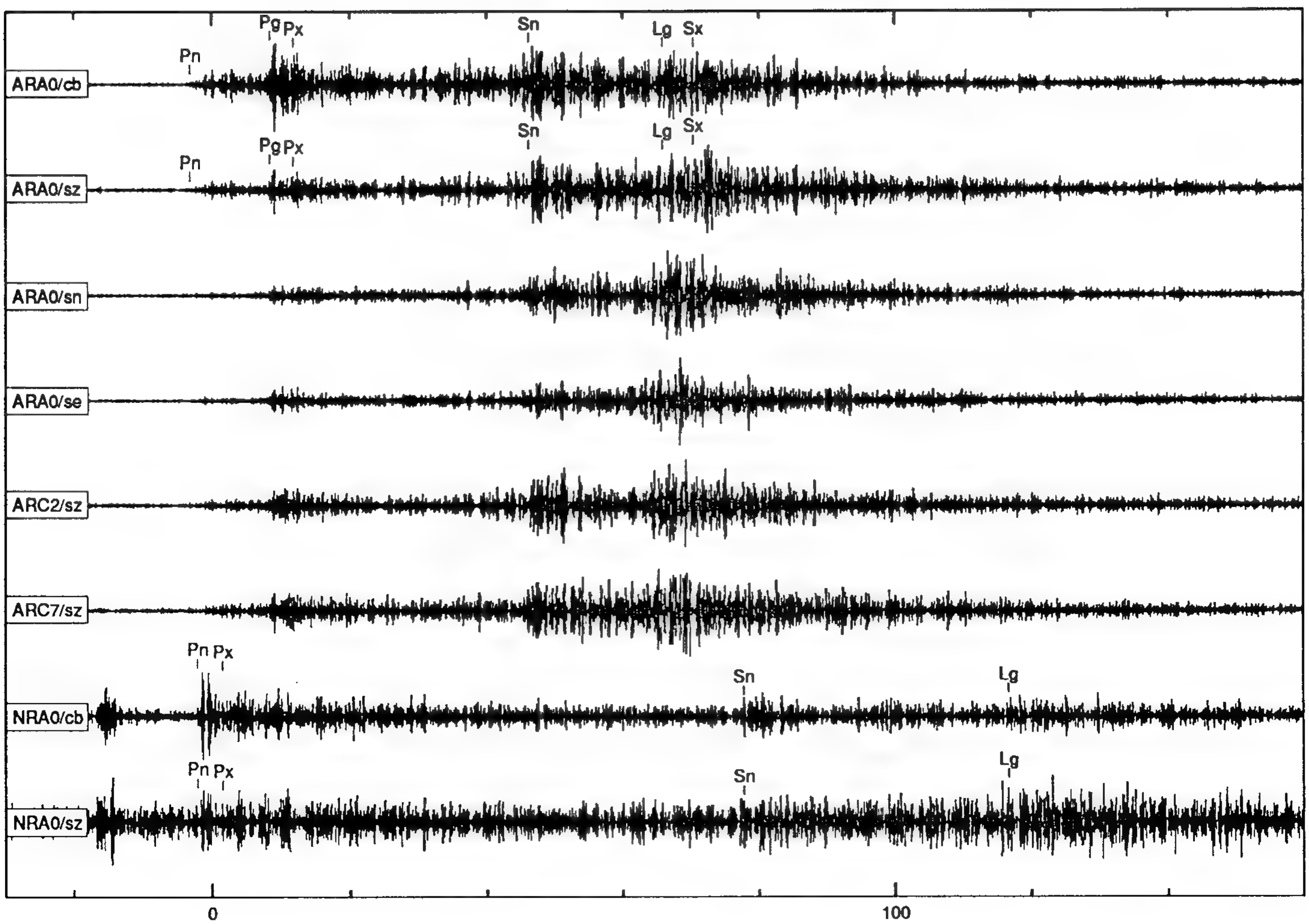




filtered 4-8 Hz

Event Number	Dataset Name	Event Type
41	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

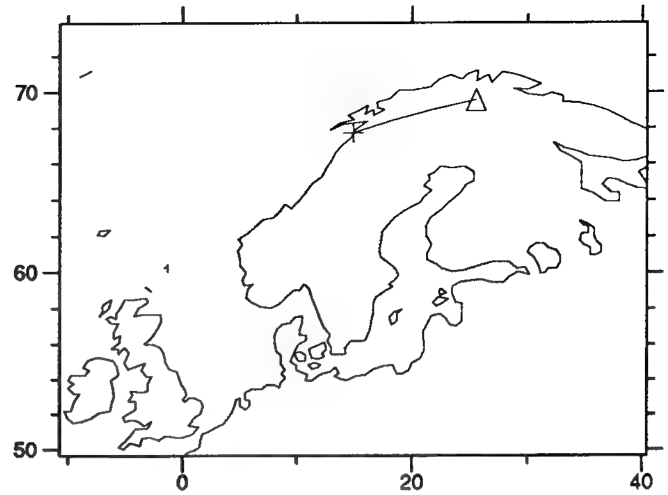
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 41

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992005	Jan 5,1992	2:31:3.900	67.7200	14.7940	12.1000	-	-	-	-	-999.00	eq+	260	BERGEN

ARA0 4.322 250.14 60.16

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Px	P	2:32:8.349	265	0.2	8.5	0	0.1	517
Pg	Pn	2:32:17.388	239	15.3	9.7	0	0.2	440
Sn	Sn	2:32:55.113	-1	-1.0	-1.0	-1	-1.0	1485
Sx	Lg	2:33:2.276	235	20.2	2.4	0	0.1	518
Lg	Sx	2:33:14.549	245	25.7	5.0	3	0.4	441



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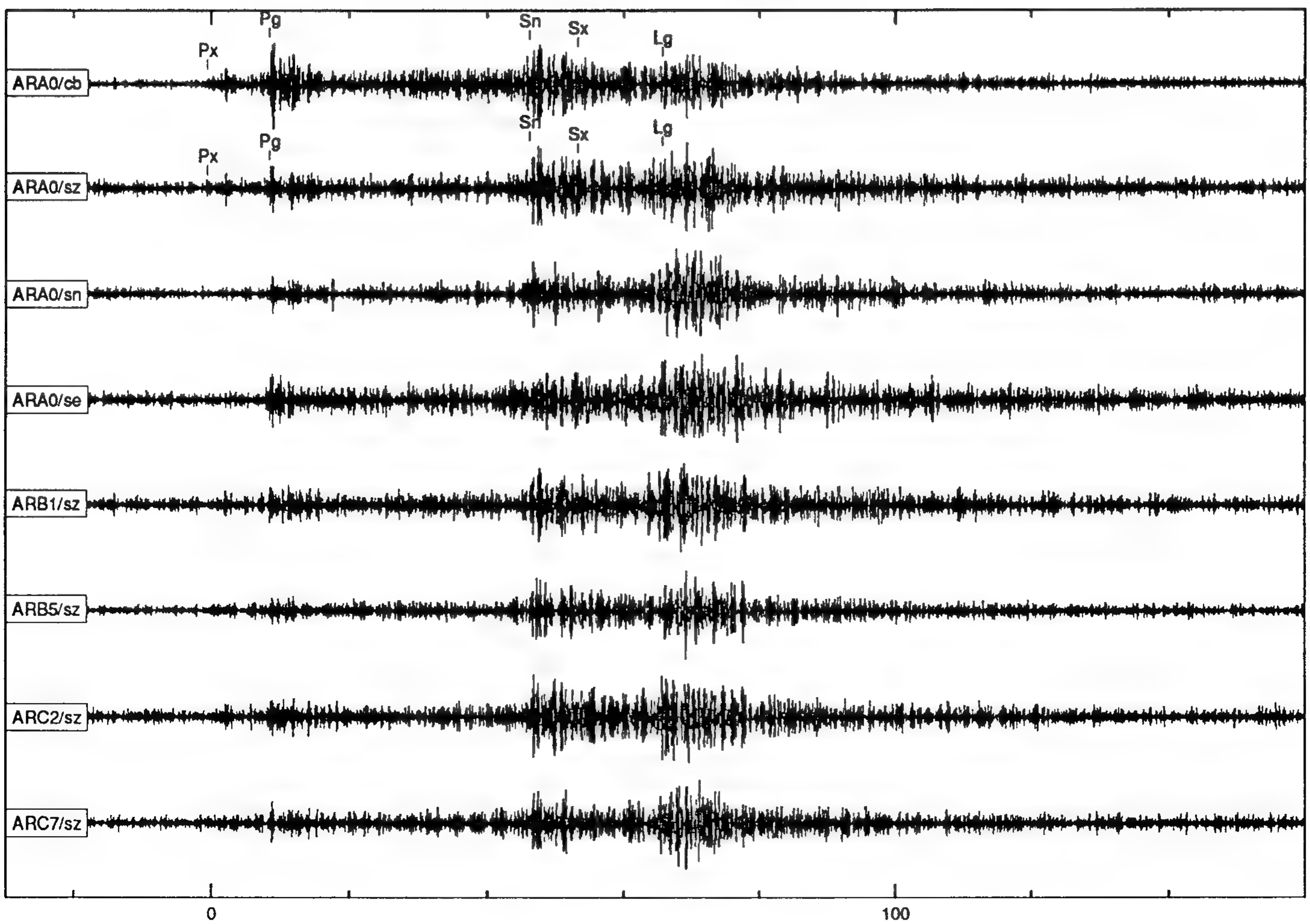


filtered 4-8 Hz

Event Number	Dataset Name	Event Type
42	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 42

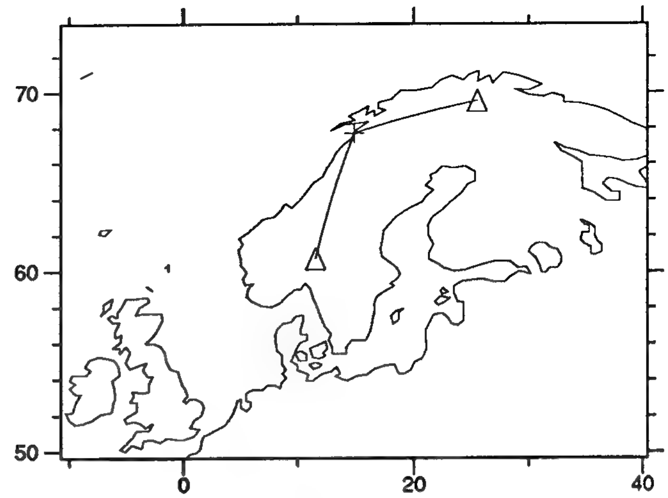
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992005	Jan 5,1992	5:11:56.300	67.7060	14.9900	0.0000	-	-	-	-	1.50	eq+	262	BERGEN

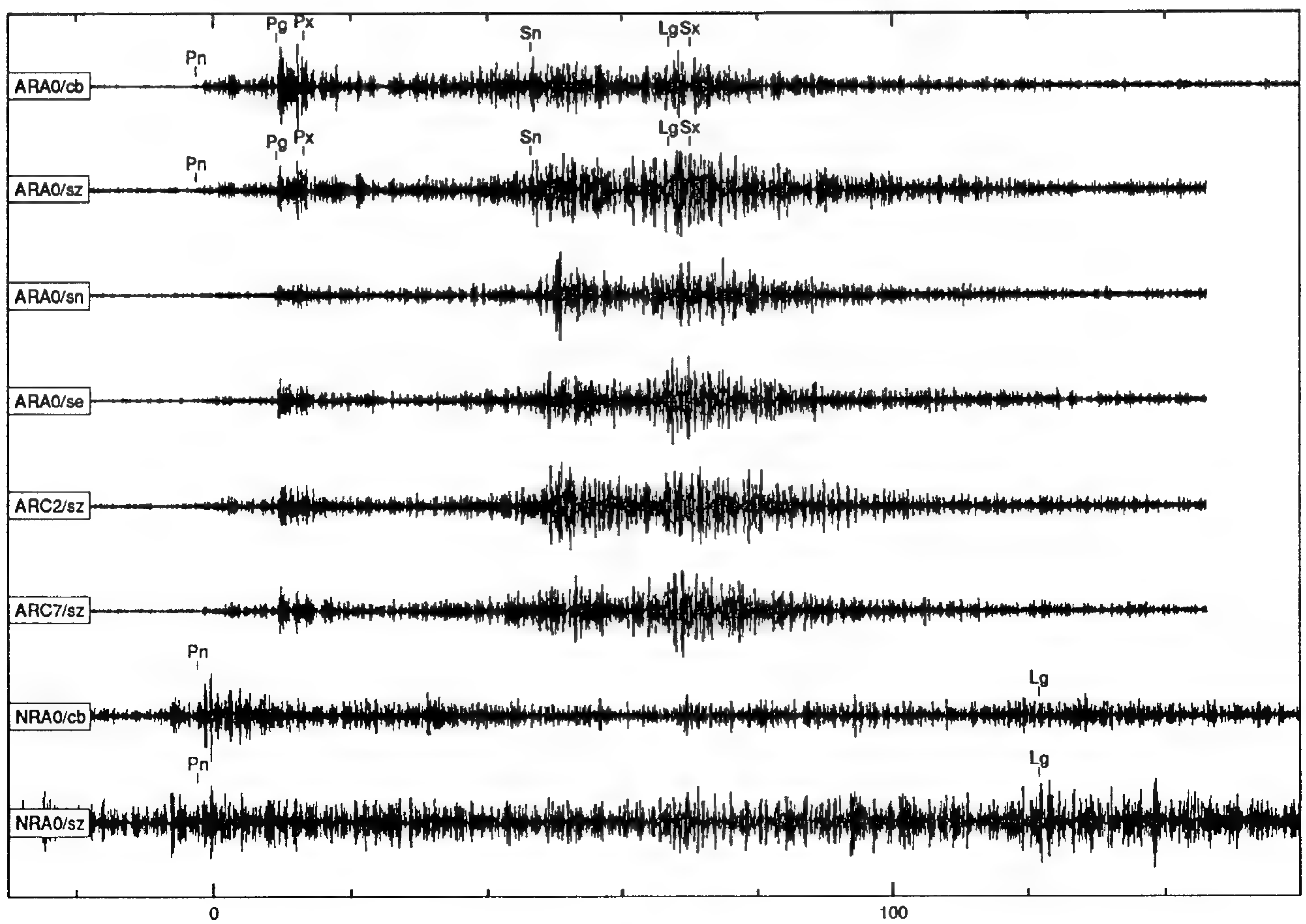
ARA0 4.264 249.47 59.68

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	5:12:59.451	234	10.7	26.8	0	0.1	442
Pg	Pn	5:13:11.276	237	16.0	12.1	2	0.2	519
Px	Px	5:13:15.034	227	14.7	7.3	0	0.2	520
Sn	Sx	5:13:48.301	248	22.3	4.5	2	0.1	444
Lg	Lg	5:14:8.851	243	23.0	11.8	3	0.4	445
Sx	Sx	5:14:12.135	228	29.5	2.9	3	0.2	521

NRA0 7.158 10.61 193.72

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	5:13:39.311	7	13.9	5.0	0	0.2	443
Lg	Lg	5:15:43.111	-1	-1.0	-1.0	-1	-1.0	1488





filtered 4-8 Hz

Event Number	Dataset Name	Event Type
44	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

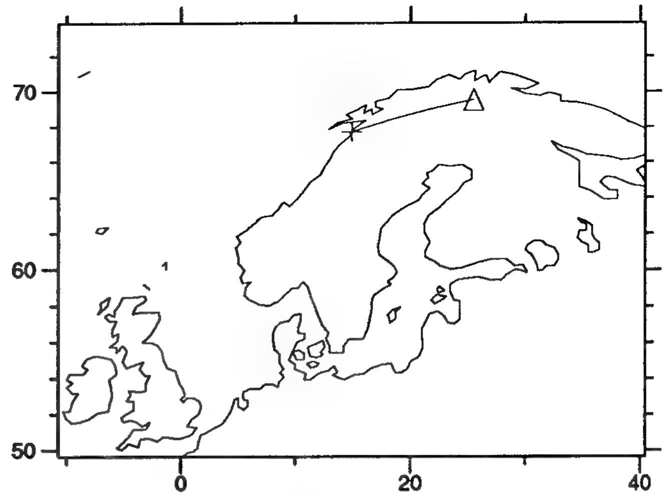
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

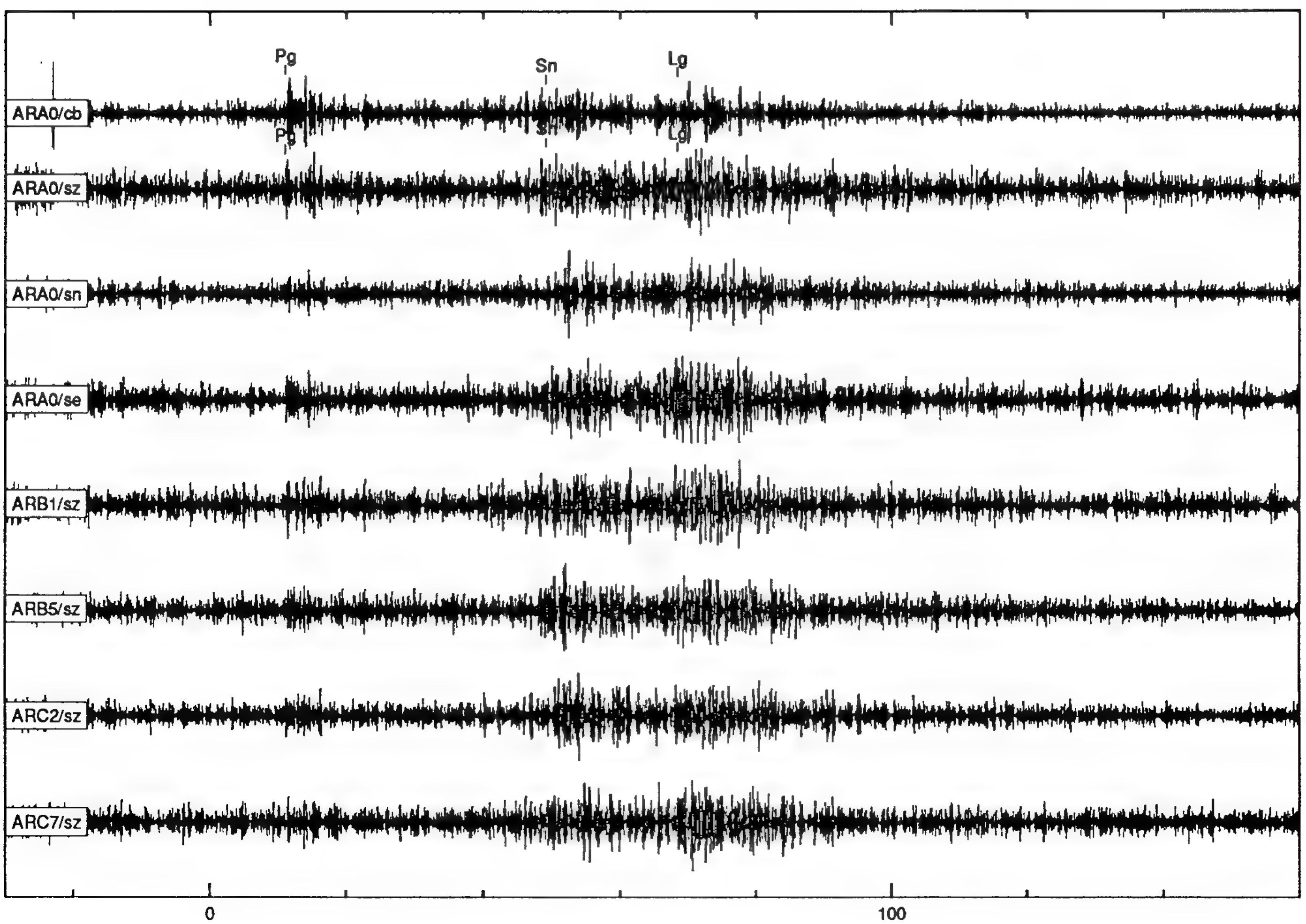
Data Set 2, Event 44

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992005	Jan 5,1992	7:56:51.629	66.9401	16.2216	0.0000	-	-	-	-	-999.00	eq+	263	ARS:flori

ARA0 4.327 237.39 48.77

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	7:58:9.190	237	15.9	4.2	0	0.2	446
Sn	Sn	7:58:47.295	15	5.8	4.8	1	0.4	622
Lg	Sx	7:59:6.640	237	24.2	3.4	2	0.4	447





filtered 4-8 Hz

Event Number	Dataset Name	Event Type
46	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

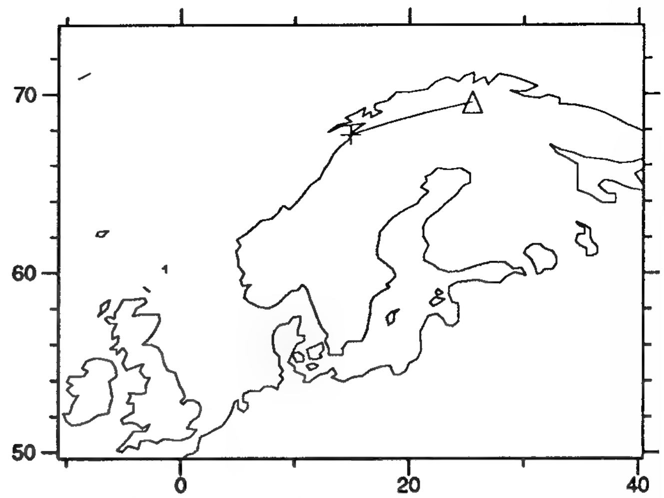
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 46

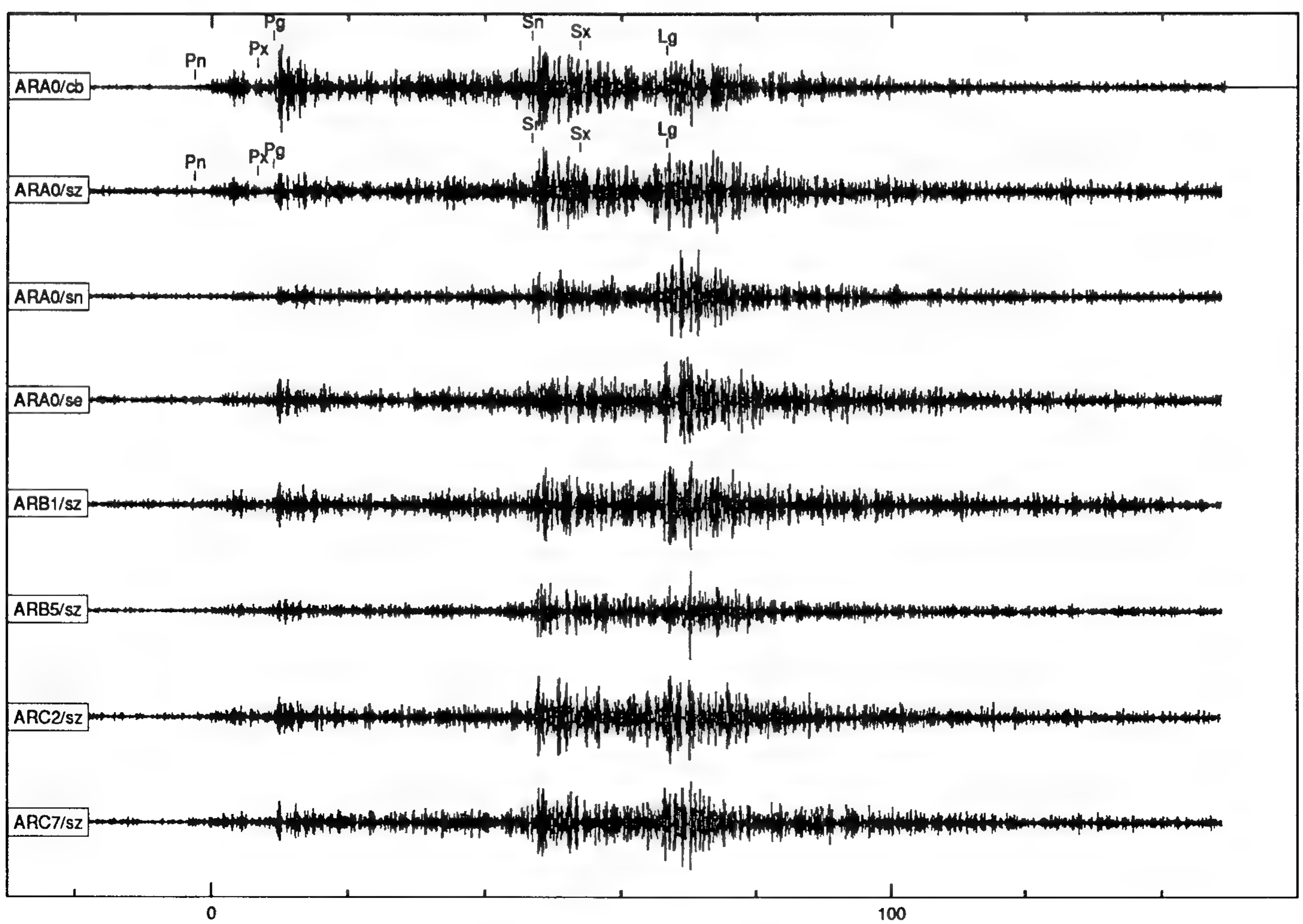
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992006	Jan 6,1992	8:26:21.800	67.7010	14.9650	0.0000	-	-	-	-	1.30	eq+	264	BERGEN

ARA0 4.275 249.48 59.67

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:27:25.183	234	11.1	15.9	0	0.1	448
Px	P	8:27:34.230	237	5.1	4.6	0	0.2	449
Pg	Px	8:27:36.599	240	15.5	10.6	0	0.2	450
Sn	Lg	8:28:14.449	238	24.3	4.1	1	0.1	451
Sx	Sx	8:28:21.556	238	21.3	2.6	1	0.2	452
Lg	Sx	8:28:34.358	243	25.5	6.3	5	0.4	453



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
49	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 49

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992010	Jan 10,1992	22:25:42.200	67.7110	14.9820	2.2000	-	-	-	-	-999.00	eq++	265	BERGEN

ARA0 4.264 249.55 59.76

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:26:45.825	236	11.2	36.4	1	0.1	527
Px	Pg	22:26:56.378	239	15.7	18.1	2	0.2	528
Pg	Px	22:26:57.238	242	15.3	7.8	1	0.3	529
Sn	Sx	22:27:34.953	245	21.1	4.0	5	0.1	531
Sx	Lg	22:27:41.559	239	23.2	2.8	2	0.1	533
Lg	Sx	22:27:54.900	240	24.4	10.7	24	0.4	534
Sx	Sx	22:27:59.403	243	26.1	2.8	9	0.4	625

NRA0 7.162 10.58 193.68

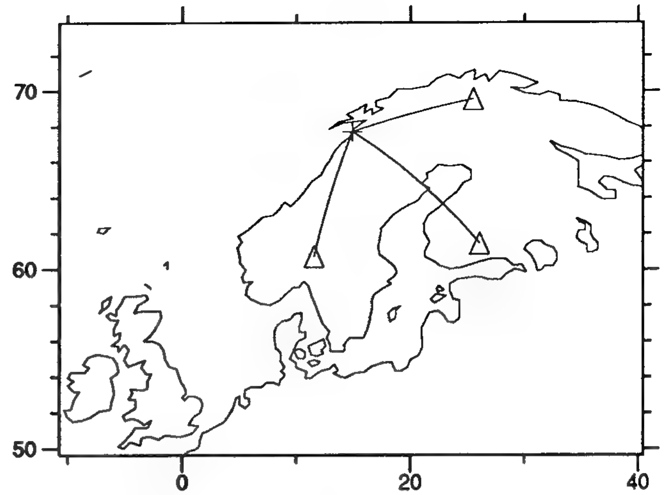
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:27:25.896	6	12.7	9.7	1	0.2	530
Sn	Sx	22:28:46.371	20	22.4	3.0	2	0.3	535
Lg	Sx	22:29:25.596	12	29.1	2.6	3	0.4	536
Sx	Lg	22:29:28.718	14	30.3	4.4	1	0.4	537
Sx	Sx	22:29:31.993	20	29.0	4.2	1	0.3	538

FIA1 7.884 327.64 137.61

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Sn	Sn	22:28:59.385	-1	-1.0	-1.0	-1	-1.0	1489

FIA0 7.885 327.65 137.62

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:27:35.262	332	13.2	11.0	0	0.2	532
Lg	Sx	22:29:45.287	322	27.0	2.6	3	0.4	539
Sx	Sx	22:29:51.500	323	25.7	2.7	3	0.3	626
Sx	Sx	22:29:54.675	324	29.8	2.6	4	0.4	627



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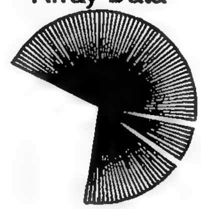
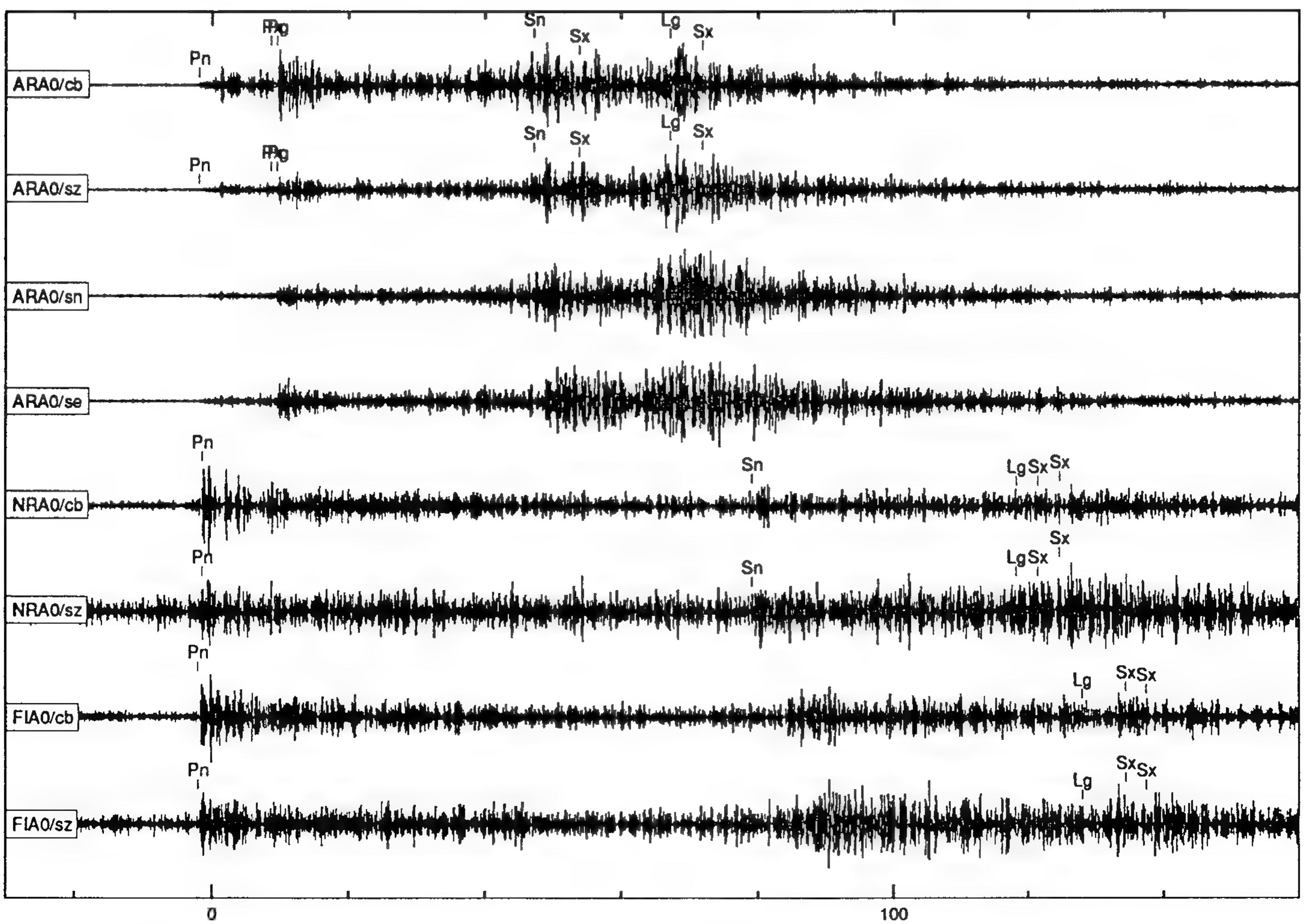




filtered 4-8 Hz

Event Number	Dataset Name	Event Type
50	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

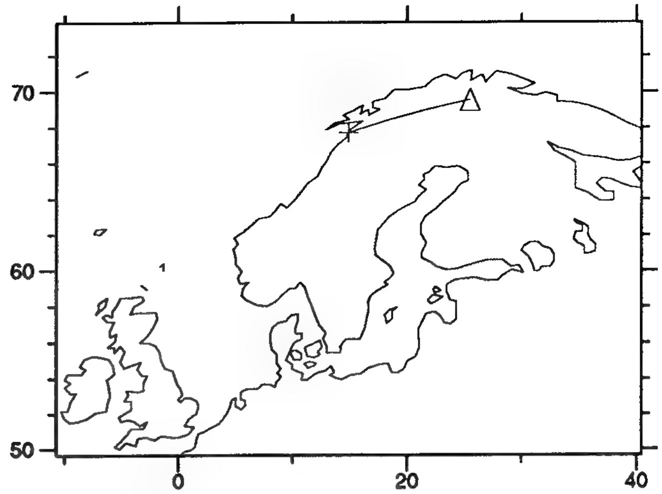
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 50

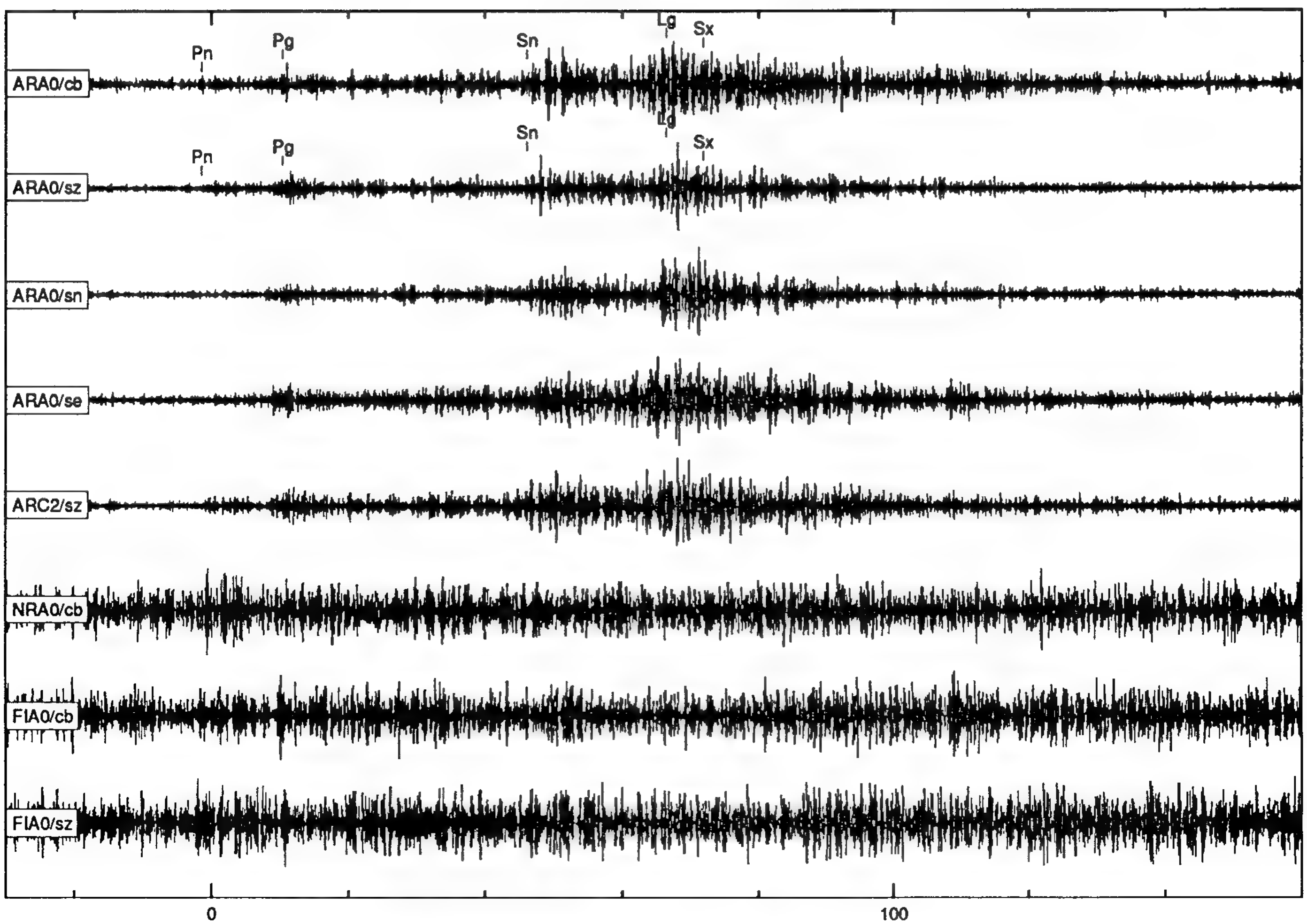
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992011	Jan 11,1992	1:17:29.300	67.6990	14.9130	0.0000	-	-	-	-	1.50	eq+	266	BERGEN

ARA0 4.293 249.59 59.73

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	1:18:33.835	230	10.6	14.2	0	0.1	632
Pg	Pg	1:18:45.760	242	15.0	8.1	1	0.3	633
Sn	Sn	1:19:21.642	240	20.4	3.0	1	0.2	634
Lg	Lg	1:19:41.863	241	20.4	6.6	5	0.4	635
Sx	Sx	1:19:47.093	247	27.4	2.5	2	0.3	636



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
51	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

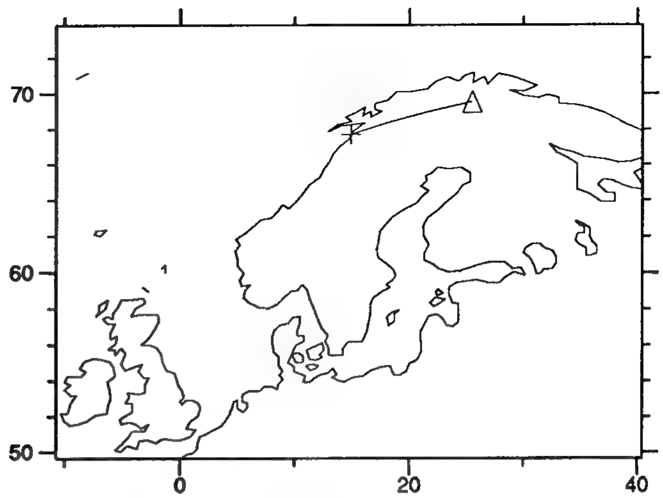
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 51

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992011	Jan 11,1992	1:45:37.200	67.7380	14.8790	12.1000	-	-	-	-	1.20	eq+	267	BERGEN

ARA0 4.285 250.13 60.24

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	1:46:41.088	233	10.6	11.2	0	0.1	550
Pg	Px	1:46:52.800	242	15.0	11.0	1	0.2	551
Sn	Lg	1:47:28.700	240	20.2	3.4	0	0.1	552
Lg	Sx	1:47:48.675	240	21.5	5.9	4	0.4	553
Sx	Sx	1:47:53.432	231	24.2	2.7	2	0.2	642



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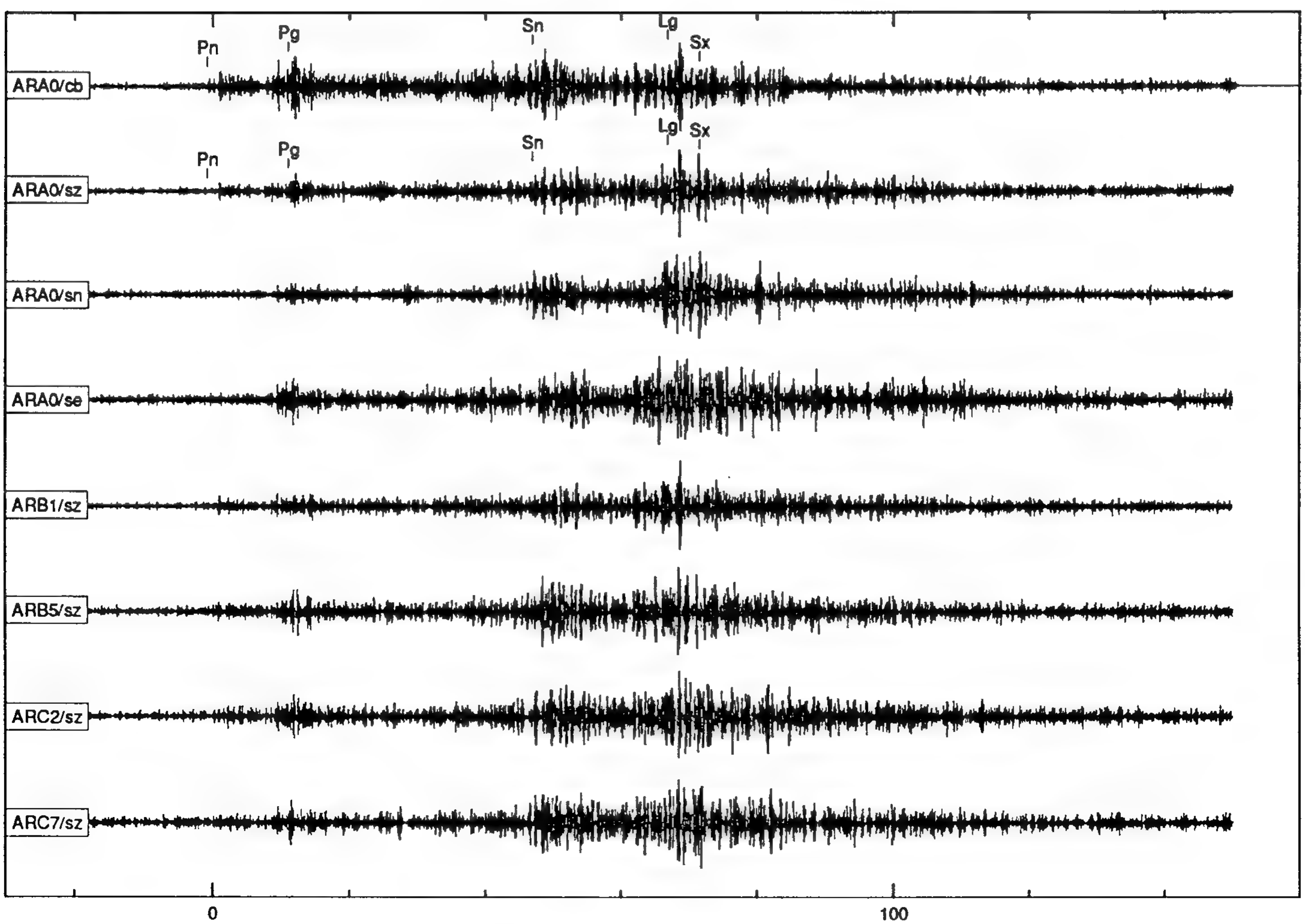


filtered 4-8 Hz

Event Number	Dataset Name	Event Type
58	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 58

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992025	Jan 25,1992	11:57:34.500	67.6880	14.9310	0.0000	-	-	-	-	1.80	eq+	268	BERGEN

ARA0 4.293 249.42 59.57

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:58:37.095	236	10.8	35.5	1	0.1	653
Pg	Pn	11:58:48.270	236	15.8	11.5	4	0.2	654
Px	Px	11:58:50.367	236	15.1	11.6	2	0.2	655
Sn	Lg	11:59:26.818	248	21.9	4.1	4	0.1	657
Sx	Lg	11:59:32.568	235	22.4	2.5	3	0.1	659
Lg	Sx	11:59:46.095	242	25.2	8.7	17	0.4	660

NRA0 7.135 10.47 193.53

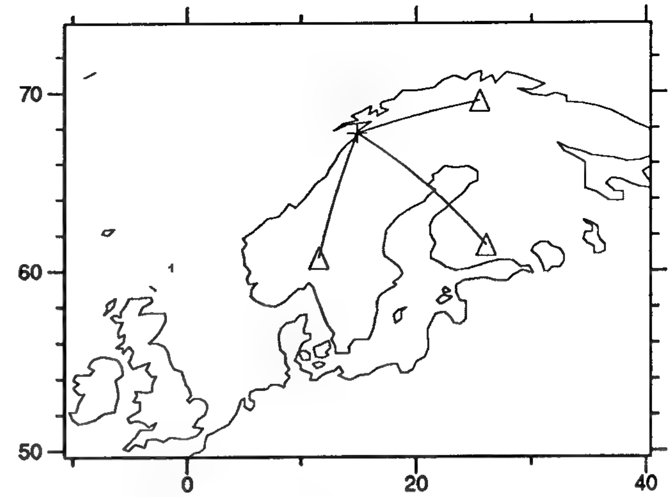
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:59:18.133	9	13.7	7.0	0	0.2	656
Sn	Sn	12:00:38.406	-1	-1.0	-1.0	-1	-1.0	1491
Lg	Lg	12:01:18.358	-1	-1.0	-1.0	-1	-1.0	1492

FIA1 7.881 327.42 137.34

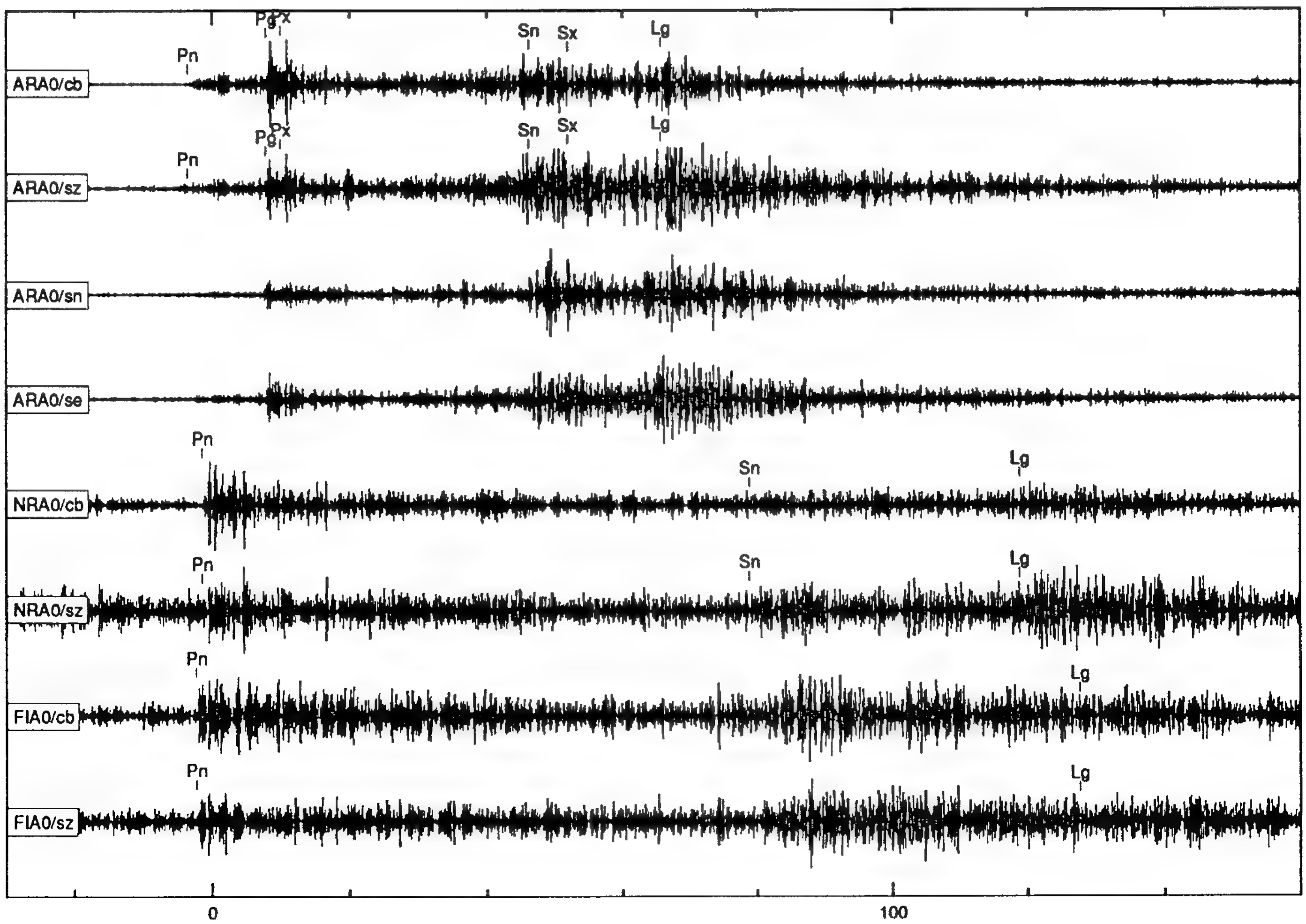
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Sn	Sn	12:00:53.181	-1	-1.0	-1.0	-1	-1.0	1490

FIA0 7.881 327.43 137.35

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:59:27.485	326	13.3	7.2	0	0.2	658
Lg	Lg	12:01:37.135	-1	-1.0	-1.0	-1	-1.0	1493



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
59	#2: STEIGEN	eq++

attribute	Ground Truth	refid
etype	Felt Earthquake	-999

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
22	Helsinki Bulletin, reported as "EARTHQUAKE, FELT"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228
29	Felt earthquake	503

Data Set 2, Event 59

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992025	Jan 25,1992	12:16:48.300	67.7140	14.8750	12.1000	-	-	-	-	3.80	eq++	274	BERGEN

ARA0 4.298 249.86 59.97

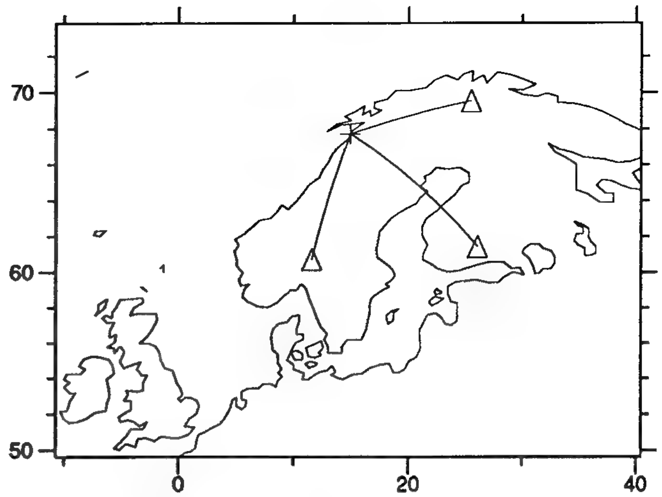
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:17:49.808	243	12.9	230.7	10	0.2	664
Pg	Pg	12:18:1.258	238	15.8	37.9	4	0.2	665
Px	Pn	12:18:3.153	234	16.1	13.9	2	0.3	704
Px	Px	12:18:9.203	232	13.9	3.6	7	0.4	705
Px	Pn	12:18:33.278	252	13.5	2.7	12	0.4	723
Sn	Sx	12:18:39.527	237	24.0	5.0	7	0.1	667
Lg	Sx	12:18:59.033	246	26.6	12.7	105	0.5	670
Sx	Lg	12:19:3.504	233	26.7	5.5	14	0.3	707

NRA0 7.155 10.26 193.26

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:18:31.185	8	13.6	54.3	2	0.2	666
Px	Pn	12:18:38.307	16	14.2	6.7	0	0.2	706
Sn	Sn	12:19:50.835	25	23.9	5.4	8	0.4	671
Sx	Sx	12:19:57.895	29	24.5	2.6	4	0.4	708
Sx	Sx	12:20:8.370	19	24.6	2.9	7	0.4	673
Sx	Sx	12:20:24.895	11	29.5	3.3	13	0.5	674
Lg	Lg	12:20:31.675	3	28.9	3.5	14	0.5	725

FIA0 7.914 327.44 137.32

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:18:39.899	336	13.7	29.7	2	0.2	668
Px	Px	12:18:49.275	332	12.0	3.2	1	0.1	669
Sn	Sn	12:20:4.800	334	23.2	3.8	6	0.4	672
Sx	Sx	12:20:46.225	333	23.3	3.1	11	0.5	675
Lg	Lg	12:20:50.575	335	31.2	4.8	19	0.6	726



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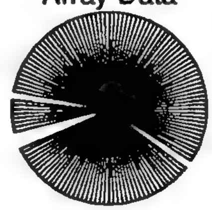
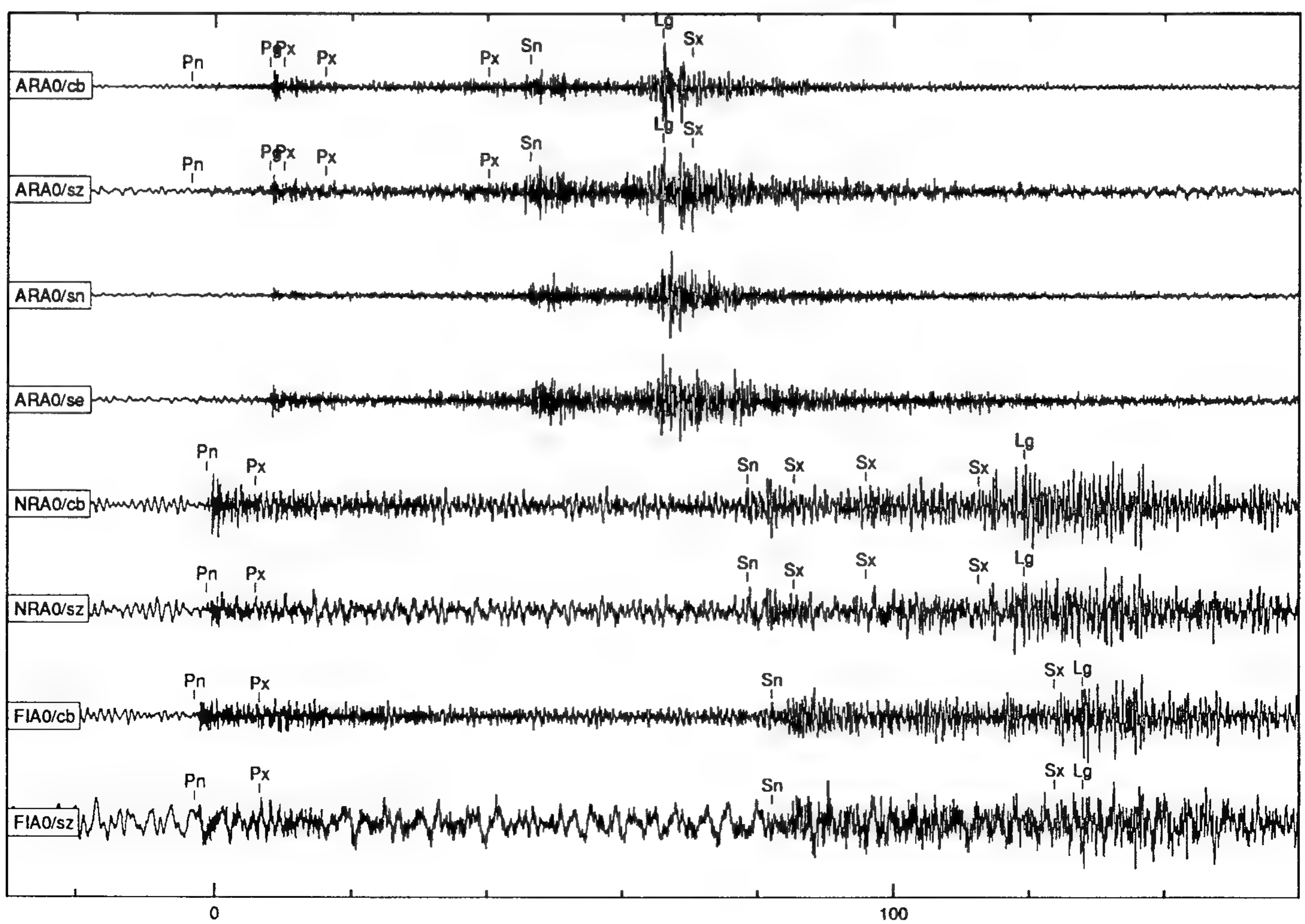




unfiltered

Event Number	Dataset Name	Event Type
60	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 60

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992025	Jan 25,1992	12:26:29.400	67.7330	15.1110	0.0000	-	-	-	-	1.90	eq+	273	BERGEN

ARA0 4.211 249.48 59.80

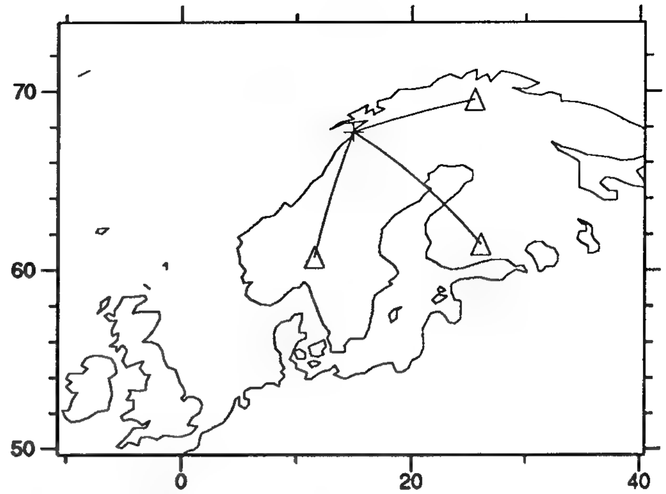
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:27:32.743	230	11.3	12.7	0	0.1	679
Px	Px	12:27:41.739	240	11.0	2.6	0	0.1	680
Pg	Px	12:27:44.218	237	15.8	10.7	1	0.2	681
Px	Px	12:27:50.734	236	16.0	3.5	0	0.2	682
Sn	Sx	12:28:22.047	244	20.0	3.9	3	0.2	685
Sx	Sx	12:28:29.384	241	20.6	2.8	2	0.1	729
Lg	Lg	12:28:41.576	248	25.6	10.1	12	0.4	691
Sx	Sx	12:28:46.209	249	24.0	5.0	2	0.3	692

NRA0 7.195 10.92 194.14

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:28:14.461	7	12.8	8.2	0	0.2	684

FIA0 7.868 328.02 138.11

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:28:24.112	-1	-1.0	-1.0	-1	-1.0	1494



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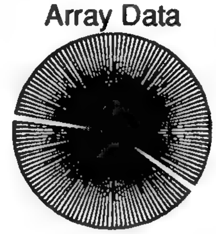
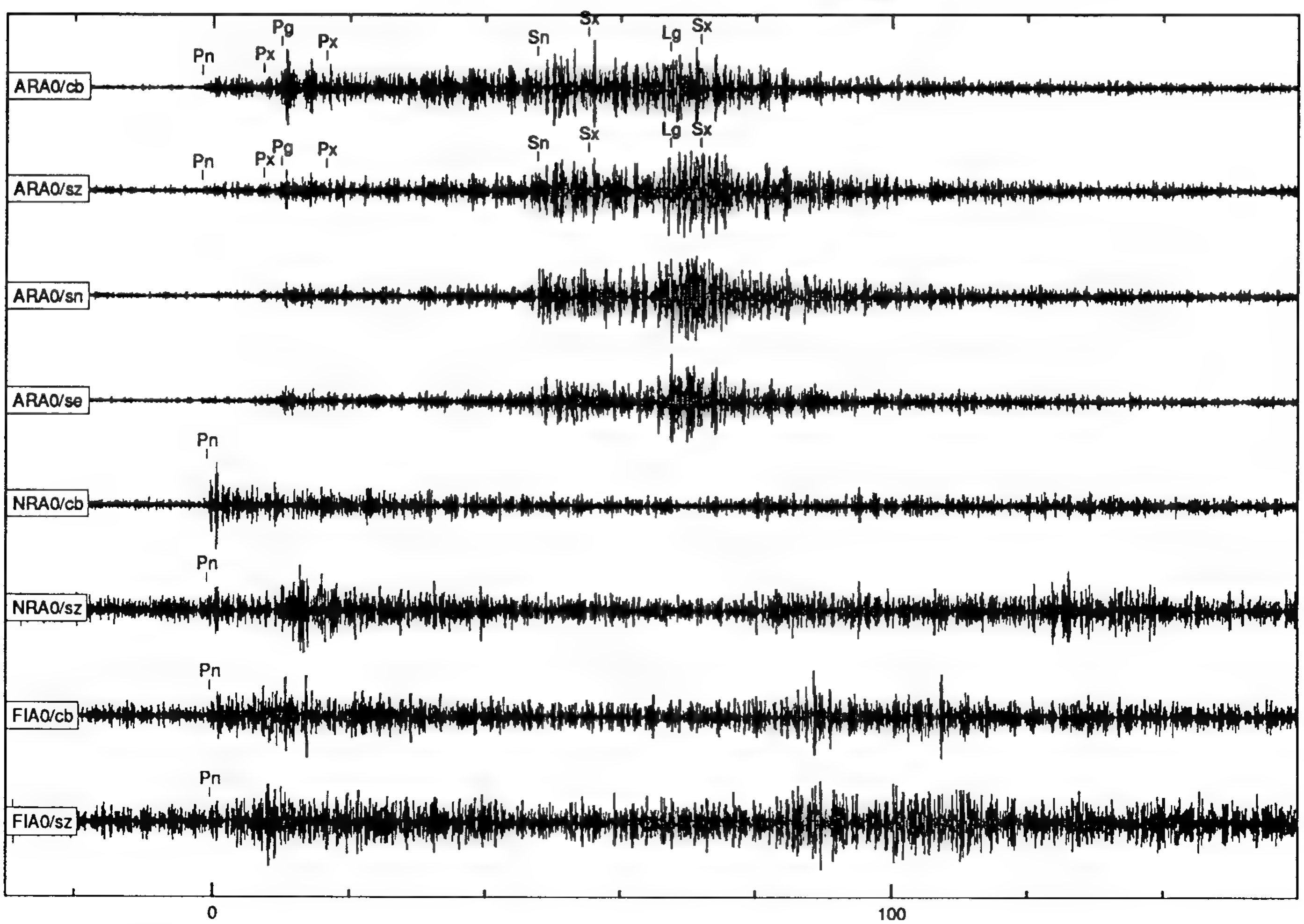




filtered 4-8 Hz

Event Number	Dataset Name	Event Type
61	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
24	Helsinki Bulletin, reported as "PROBABLY EARTHQUAKE"	212
25	Reported in Helsinki Bulletin, depth restricted to 15.0 km	212
27	Location (lat,lon,depth) and origin time (time) from Bergen Bulletin	228

Data Set 2, Event 61

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992025	Jan 25,1992	19:12:52.100	67.7380	14.6090	12.1000	-	-	-	-	1.80	eq+	275	BERGEN

ARA0 4.374 250.80 60.66

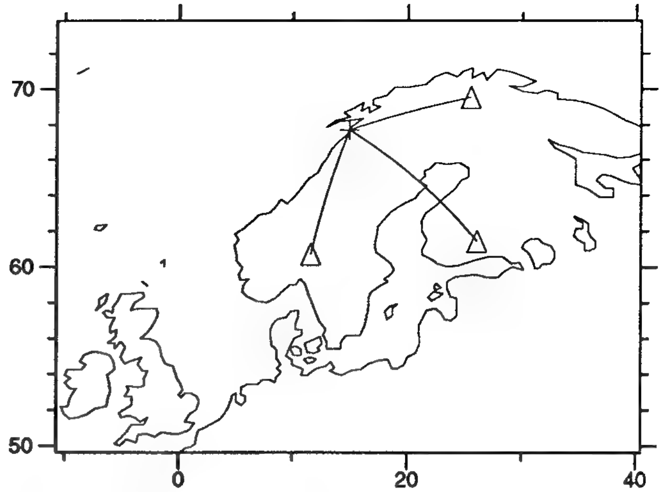
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	19:13:54.244	232	11.0	18.6	0	0.1	695
Pg	Px	19:14:5.769	238	15.6	17.3	1	0.2	696
Px	Px	19:14:6.229	246	15.0	9.4	1	0.3	697
Sn	Lg	19:14:44.344	238	23.8	3.6	1	0.1	700
Lg	Lg	19:15:3.219	249	25.9	11.8	17	0.4	701
Sx	Sx	19:15:8.005	241	22.9	4.2	2	0.3	702

NRA0 7.156 9.42 192.18

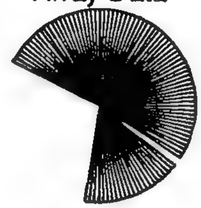
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	19:14:35.445	5	13.5	10.2	0	0.2	698
Sn	Sn	19:15:55.320	31	24.9	3.4	1	0.2	703
Lg	Lg	19:16:34.520	-1	-1.0	-1.0	-1	-1.0	1497

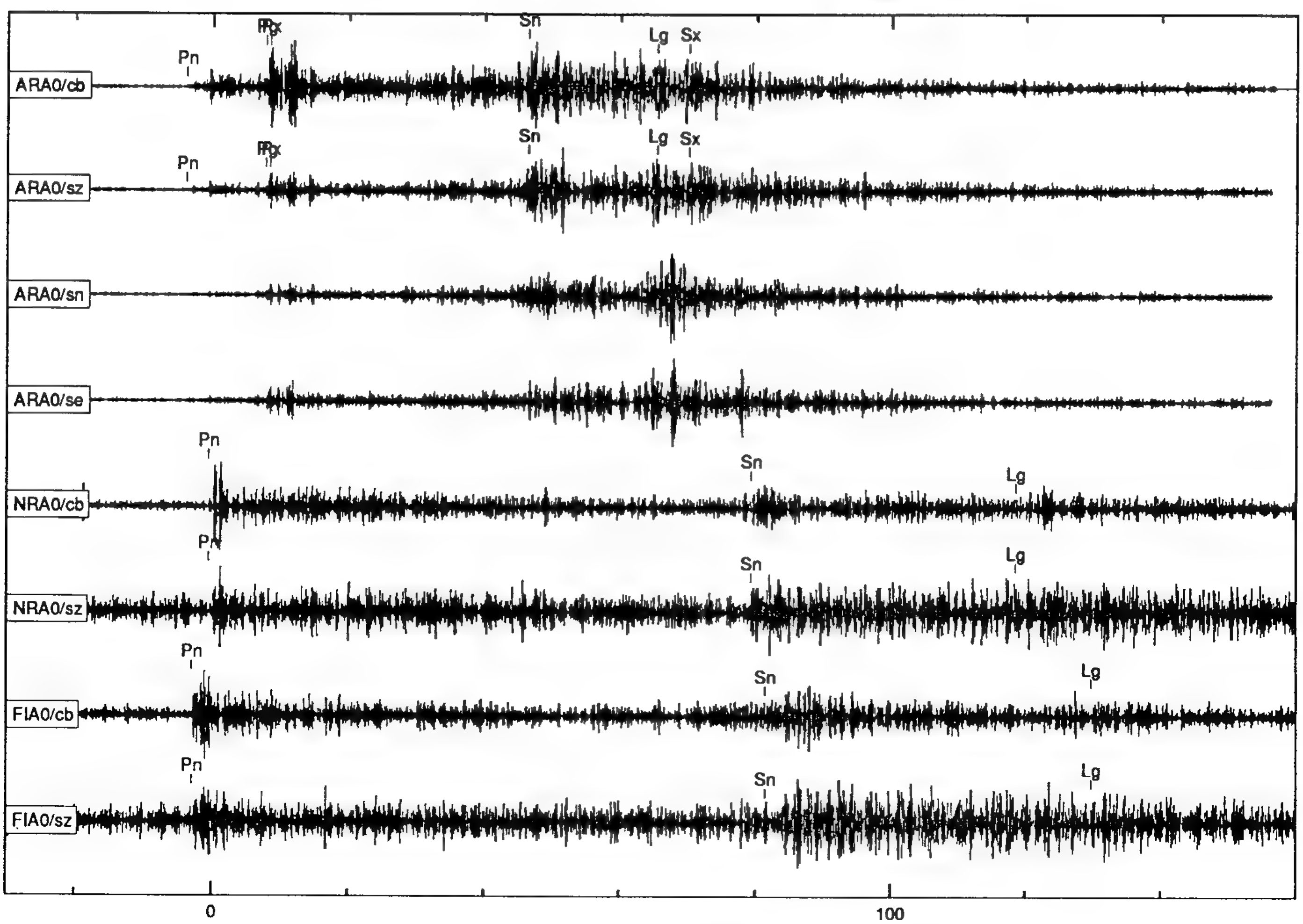
FIA0 8.001 327.03 136.66

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	19:14:44.606	322	10.7	8.5	0	0.2	699
Sn	Sn	19:16:9.006	-1	-1.0	-1.0	-1	-1.0	1496
Lg	Lg	19:16:57.206	-1	-1.0	-1.0	-1	-1.0	1495



Array Data





filtered 4-8 Hz

Event Number	Dataset Name	Event Type
62	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

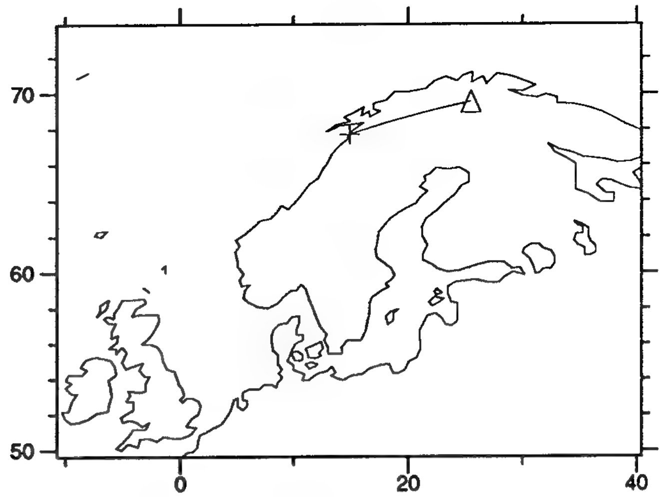
noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

Data Set 2, Event 62

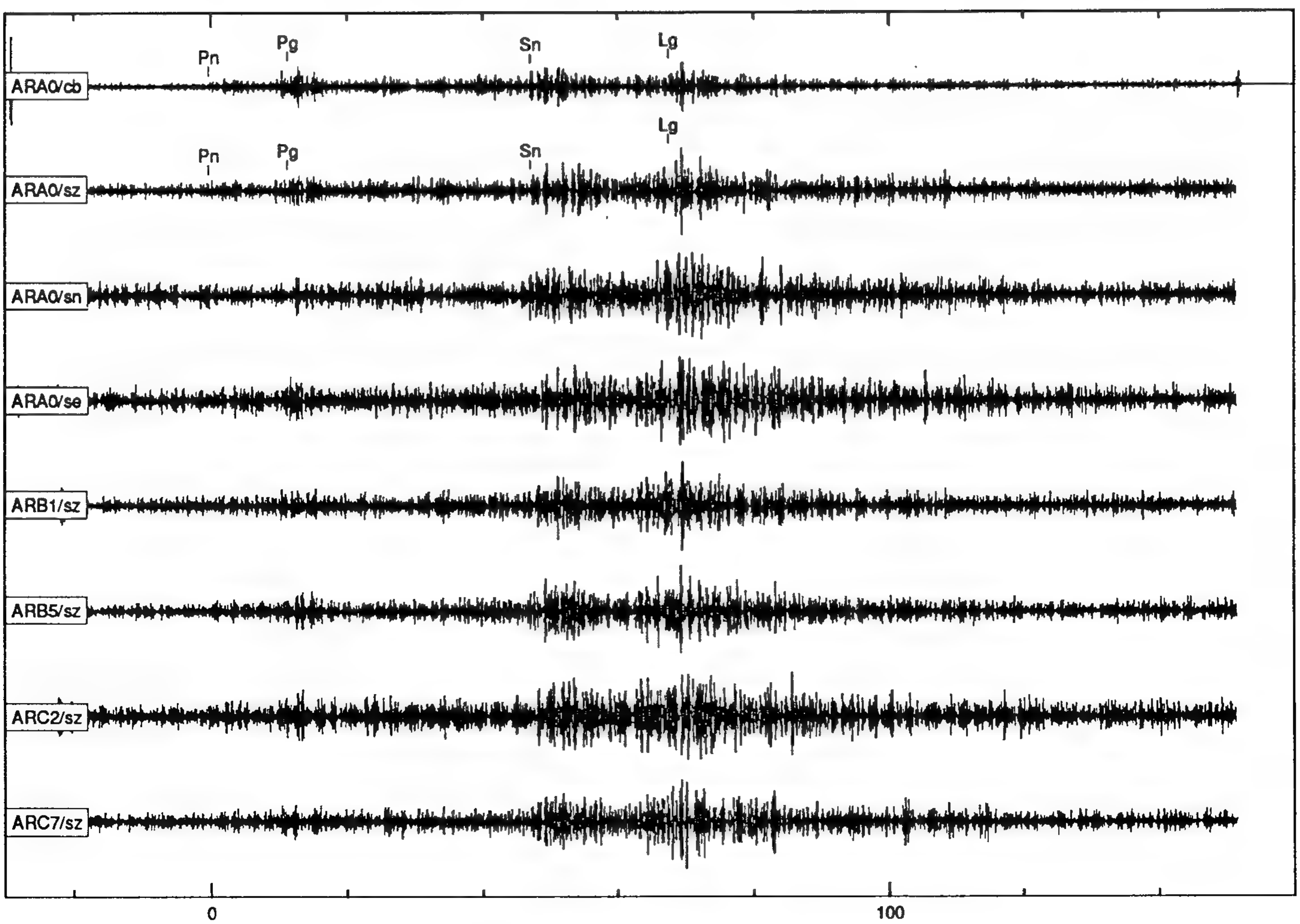
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992034	Feb 3,1992	4:15:39.166	67.3577	15.6116	0.0000	-	-	-	-	-999.00	eq+	276	ARS:flori

ARA0 4.254 243.77 54.57

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:16:44.343	229	11.4	5.0	0	0.1	731
Pg	Pg	4:16:55.943	245	14.1	6.6	0	0.2	732
Sn	Lg	4:17:31.776	244	21.4	3.1	0	0.1	733
Lg	Sx	4:17:52.318	242	22.6	3.3	3	0.4	734



Array Data



filtered 4-8 Hz

Event Number	Dataset Name	Event Type
63	#2: STEIGEN	eq+

attribute	Ground Truth	refid
etype	Earthquake in a swarm	500

noteid	Notes	refid
21	Related to 1992 Steigen earthquake swarm	500
28	Location (lat,lon,depth) and origin time (time) computed with ARS by Flori Ryall	-999

Data Set 2, Event 63

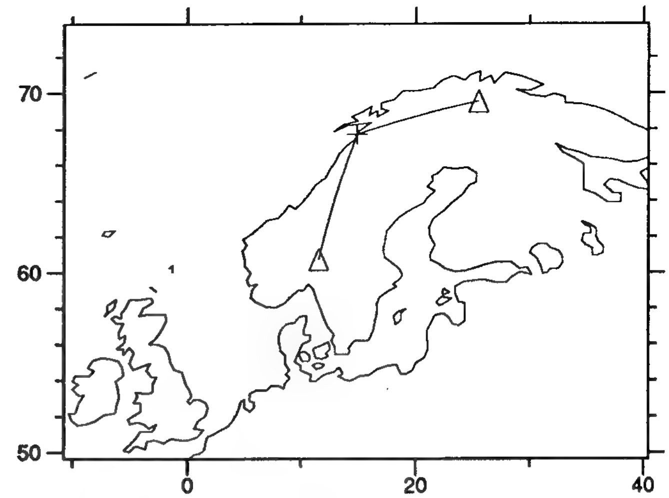
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1992034	Feb 3,1992	23:39:5.855	67.6200	15.3838	0.0000	-	-	-	-	-999.00	eq+	277	ARS:flori

ARA0 4.180 247.41 57.99

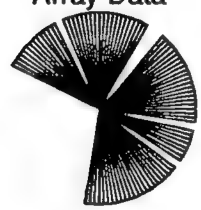
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:40:8.788	234	10.9	12.9	0	0.1	735
Pg	Pg	23:40:20.105	236	15.8	14.7	1	0.2	743
Sn	Sn	23:40:58.104	228	18.4	6.5	1	0.2	744
Lg	Sx	23:41:17.705	242	24.6	6.8	7	0.4	737

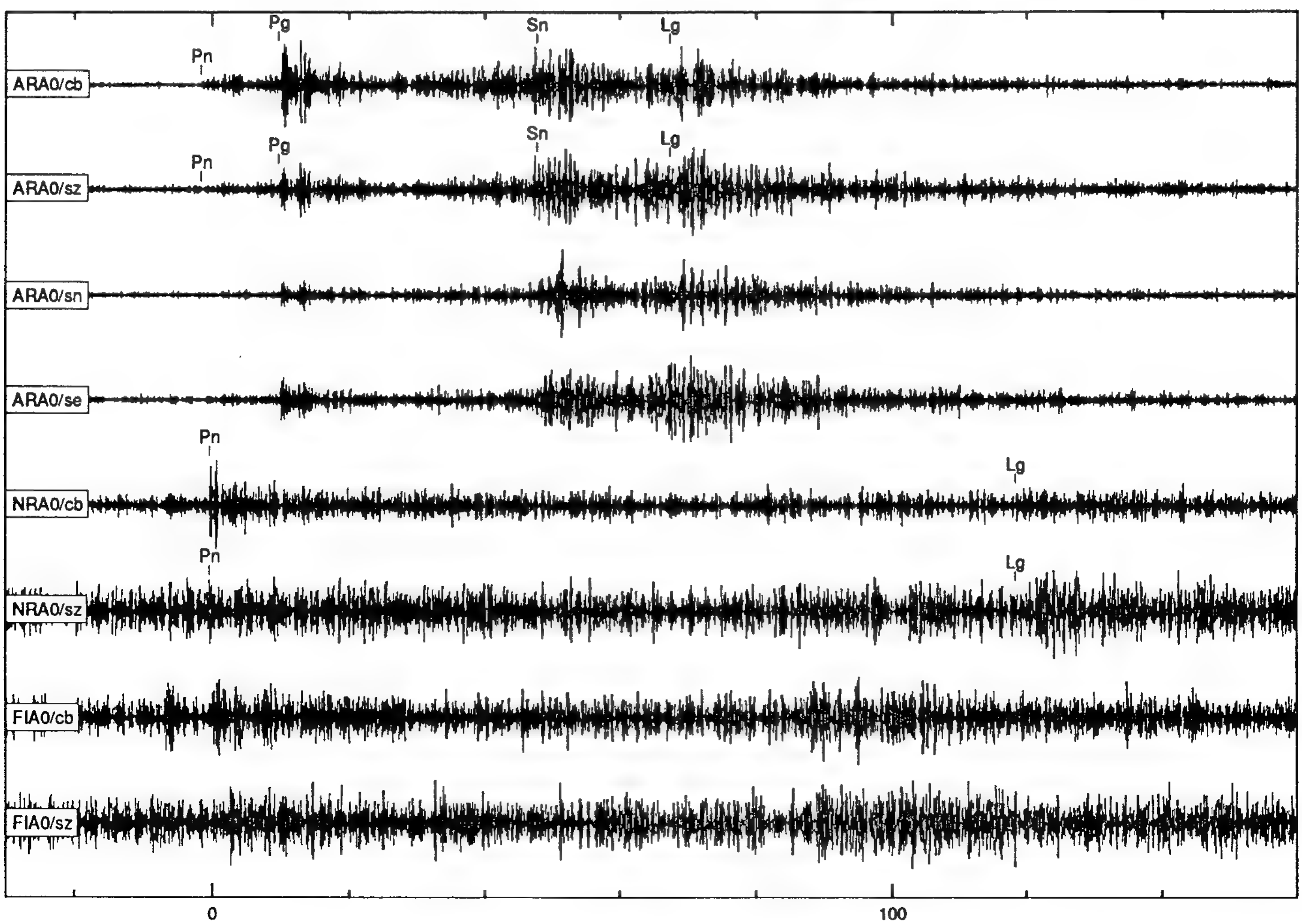
NRA0 7.112 11.96 195.42

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:40:50.105	5	12.1	4.4	0	0.2	736
Lg	Lg	23:42:48.855	-1	-1.0	-1.0	-1	-1.0	1498



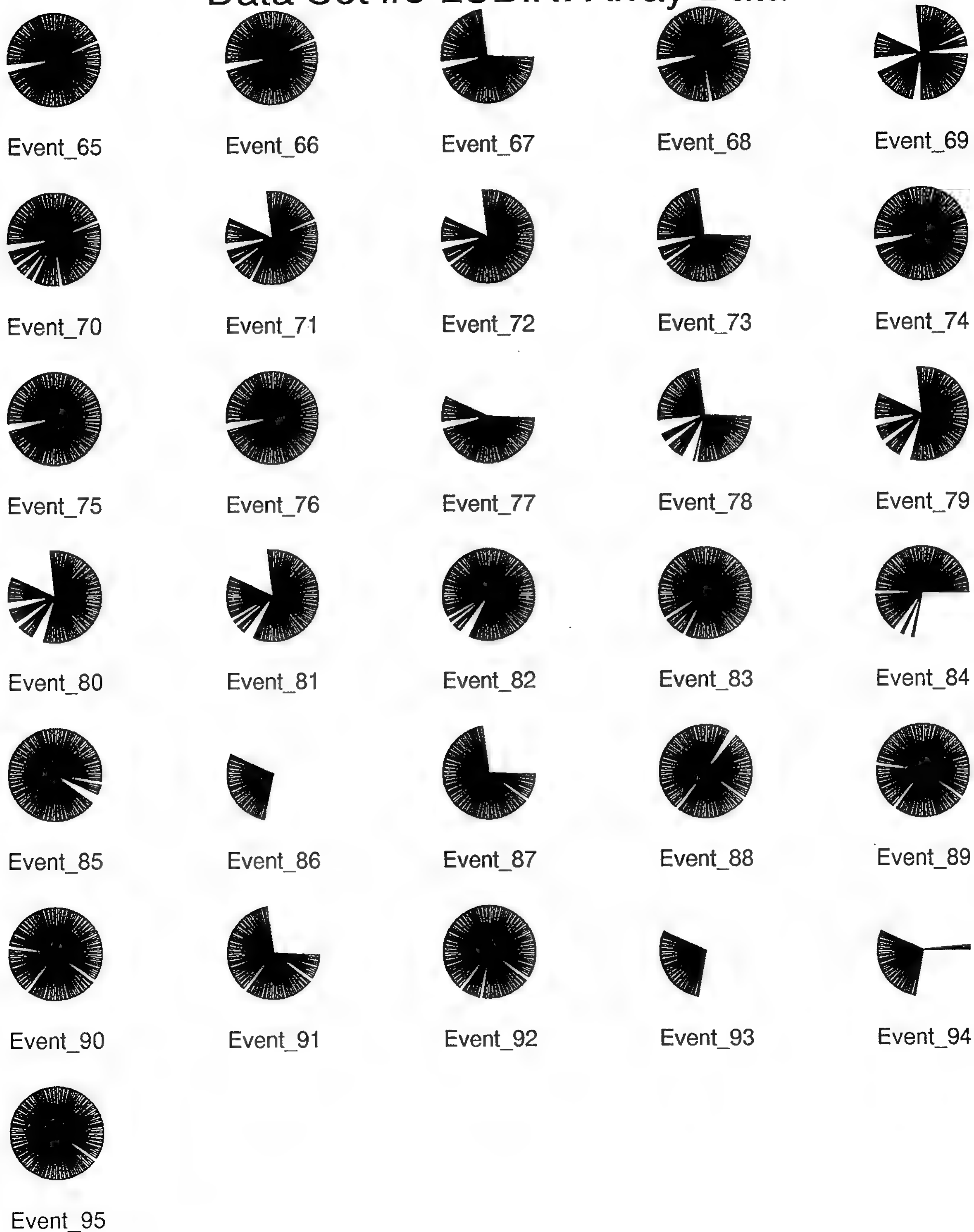
Array Data



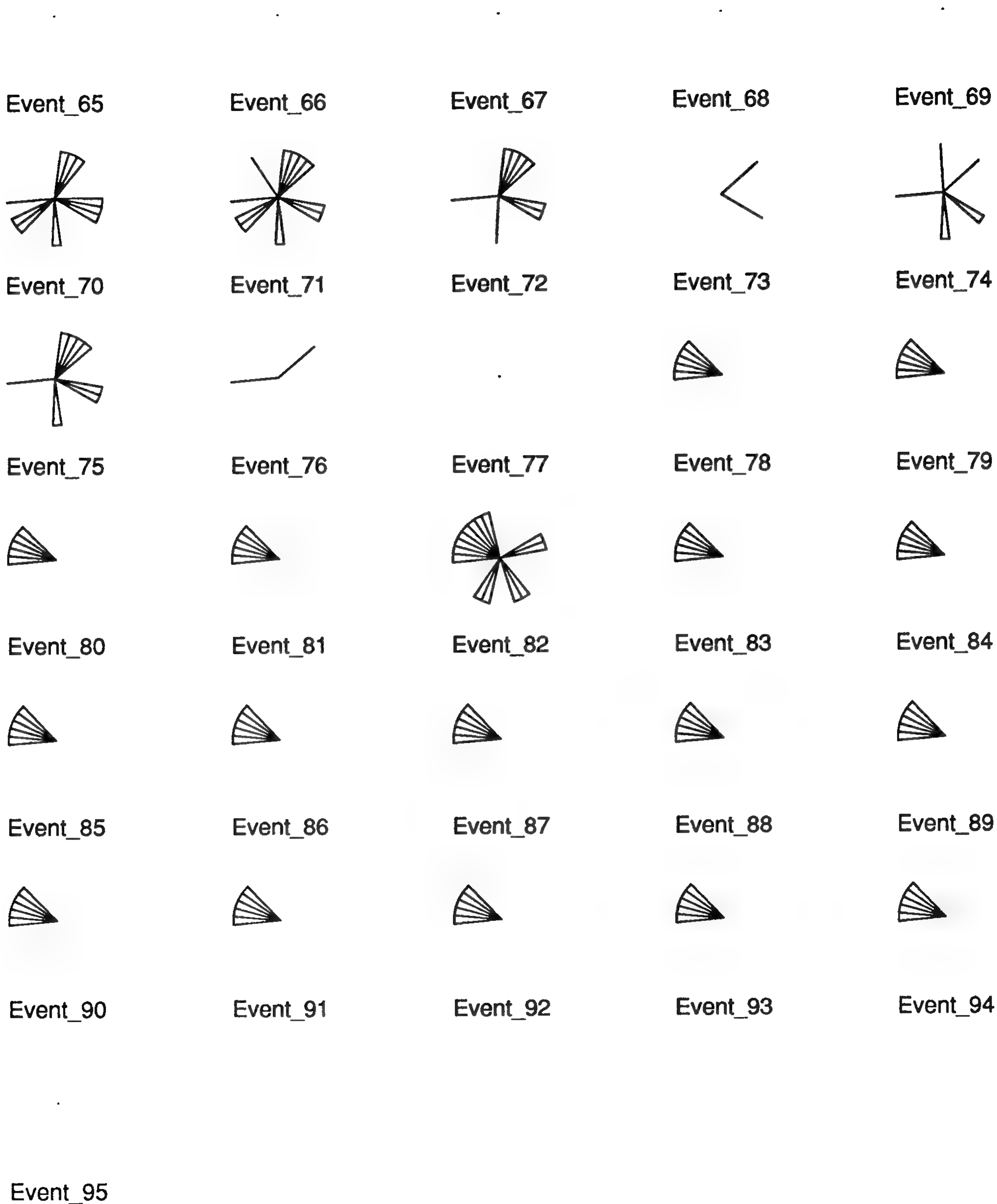


filtered 4-8 Hz

Data Set #3 LUBIN: Array Data



Data Set #3 LUBIN: GSETT-2 Data



Event Number	Dataset Name	Event Type
65	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
47	Polkowice (East); Field Descriptor G-23FILAR	505
58	horizontal location from mining seismic network - error 20 meters	505

Data Set 3, Event 65

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991071	Mar 12,1991	0:00:12.300	51.4823	16.1114	0.8430	-	-	-	-	2.87	qmt	282	WIEJACZ

GEC2 3.061 29.50 211.34

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:01:1.975	24	12.6	92.4	6	0.3	760
Pg	Px	0:01:8.676	24	18.0	15.3	8	0.5	761
Px	Pn	0:01:16.325	359	16.0	6.9	2	0.2	762
Lg	Rg	0:01:50.904	27	26.3	5.0	24	1.0	763

NRAO 9.617 162.65 346.45

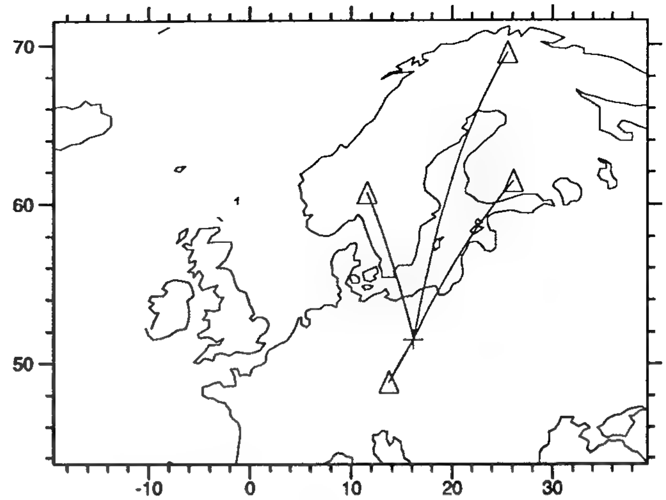
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:02:28.769	165	12.9	18.9	1	0.3	768
Px	Px	0:02:38.632	137	11.8	5.1	0	0.2	769
Sn	Sn	0:04:12.871	-1	-1.0	-1.0	-1	-1.0	1509

FIAO 11.388 213.24 24.91

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:02:53.741	209	10.8	19.3	1	0.2	765
Sn	Sn	0:04:55.616	-1	-1.0	-1.0	-1	-1.0	1508

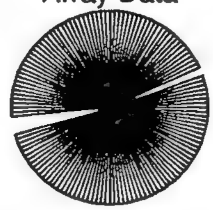
ARAO 18.650 198.61 10.34

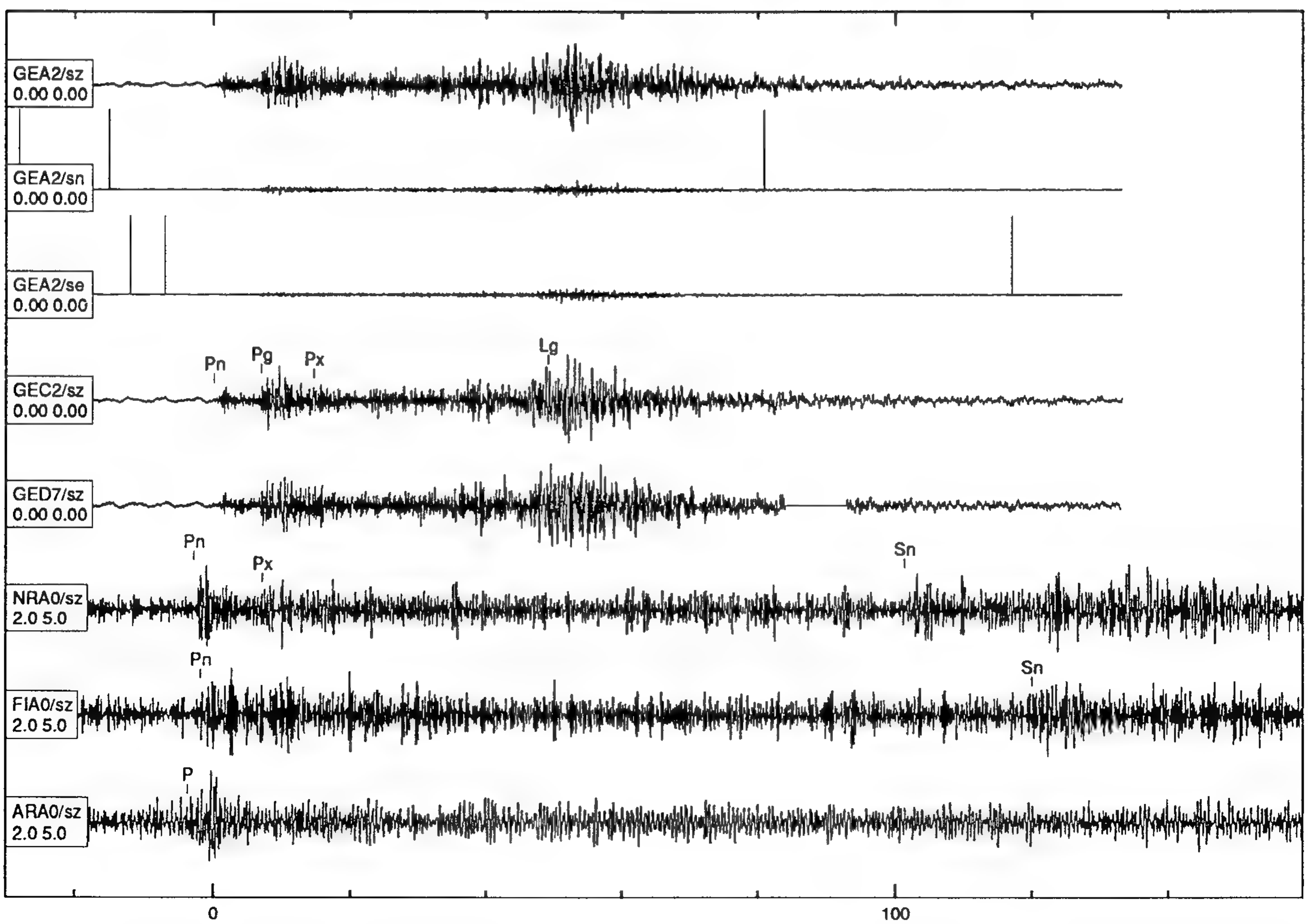
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	P	0:04:27.220	189	13.4	19.5	1	0.3	771



Array Data

GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
66	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Sieroszowice	505

noteid	Notes	refid
55	Sieroszowice (East); Field Descriptor G-21S	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 66

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991088	Mar 29,1991	3:40:25.070	51.5778	16.0753	0.9720	-	-	-	-	2.32	qmt	283	WIEJACZ

GEC2 3.132 28.23 210.05

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:41:14.820	24	12.6	35.7	[illegible]	0.3	773
Pg	Pg	3:41:21.470	24	16.7	15.8	8	0.5	774
Px	Px	3:41:27.900	12	16.0	10.3	2	0.3	775
Lg	Sx	3:42:3.045	31	24.4	4.2	14	0.7	776
Sx	Lg	3:42:9.975	27	27.1	3.6	17	0.4	777

NRA0 9.519 162.65 346.42

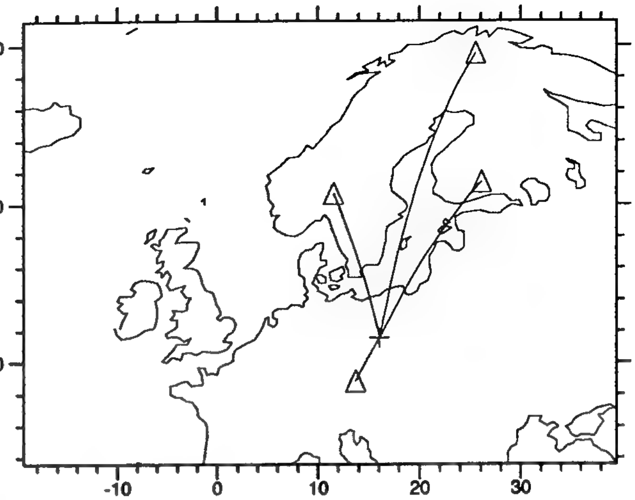
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:42:40.225	166	13.0	15.1	0	0.3	788
Sn	Sn	3:44:23.213	165	22.6	3.7	1	0.4	786
Sx	Sx	3:44:27.388	160	24.5	2.6	1	0.3	787

FIA0 11.311 213.54 25.18

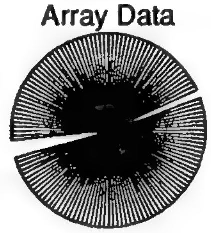
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:43:5.634	211	10.7	16.7	1	0.2	781
Sn	Sn	3:45:8.859	198	21.9	4.4	0	0.3	785

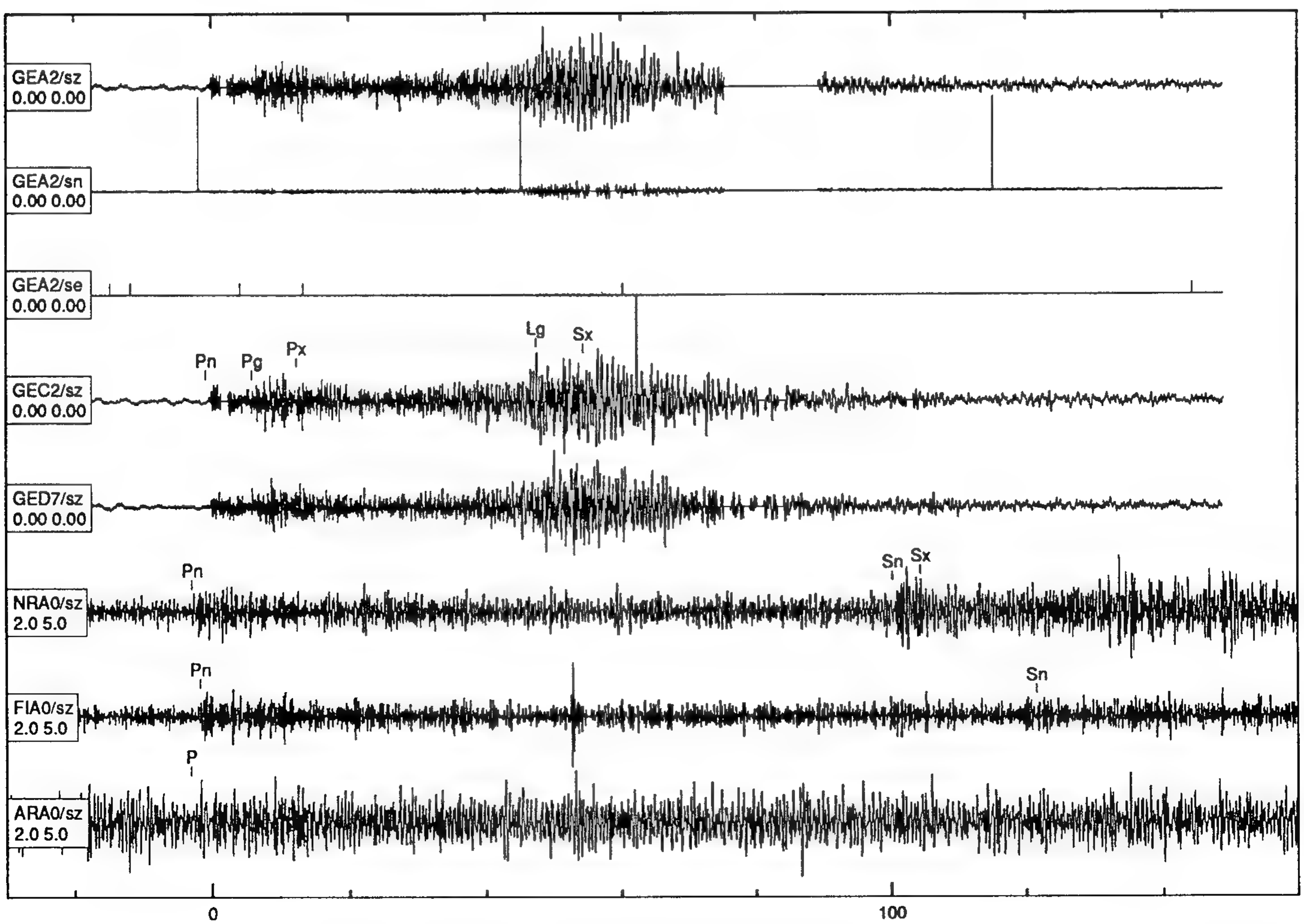
ARA0 18.560 198.74 10.43

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	P	3:44:39.696	304	4.8	4.3	0	0.2	791



Array Data GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
67	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Lubin	505

noteid	Notes	refid
40	Lubin (West); Field Descriptor G4-7/10	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 67

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991088	Mar 29,1991	13:04:52.977	51.4372	16.1256	0.7300	-	-	-	-	2.53	qmt	284	WIEJACZ

GEC2 3.027 30.08 211.94

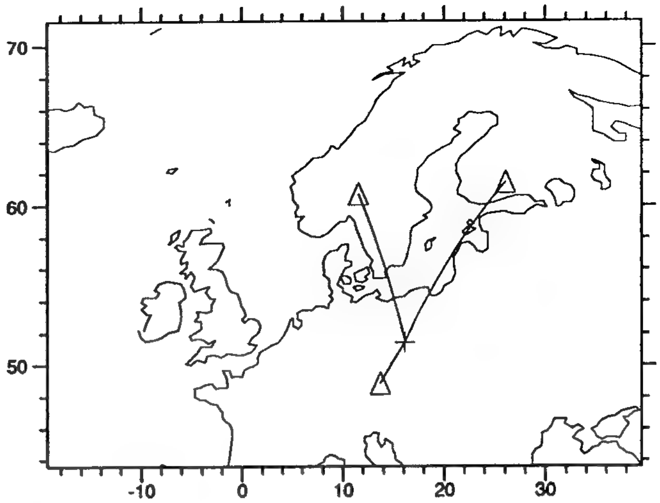
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	13:05:43.593	-1	-1.0	-1.0	-1	-1.0	1511
Pg	Pn	13:05:49.478	28	18.0	24.2	3	0.3	792
Px	Pg	13:05:52.075	36	14.0	13.6	1	0.3	793
Lg	Lg	13:06:32.825	33	26.3	4.2	6	0.4	794

NRA0 9.663 162.66 346.47

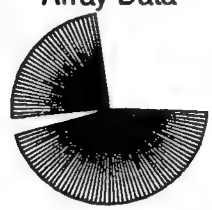
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	13:07:11.408	150	12.1	10.1	0	0.2	797
Sn	Sn	13:08:55.933	-1	-1.0	-1.0	-1	-1.0	1510

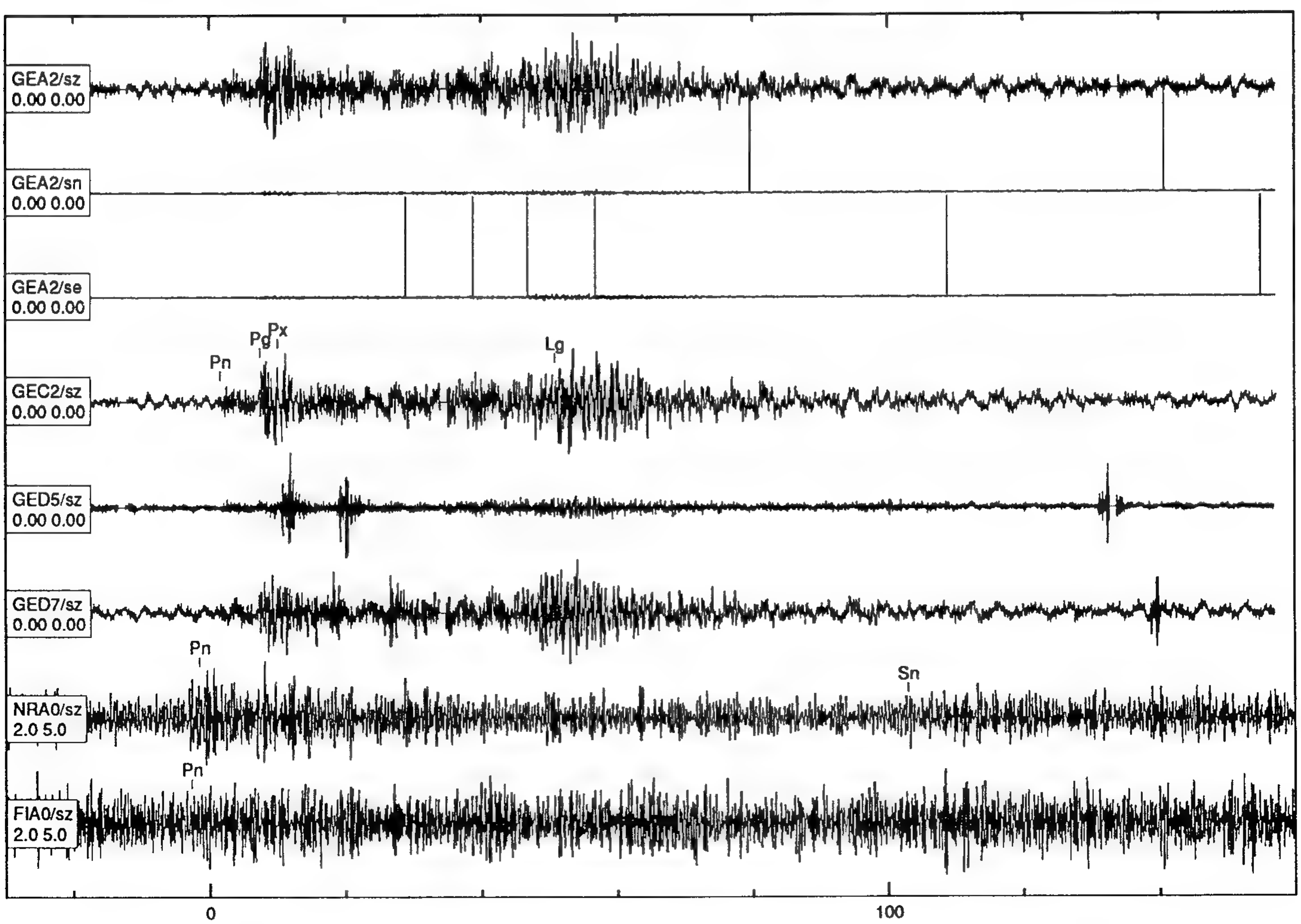
FIA0 11.425 213.10 24.78

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	P	13:07:34.224	206	6.9	5.4	0	0.2	796



Array Data GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
68	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Sieroszowice	505

noteid	Notes	refid
55	Sieroszowice (East); Field Descriptor G-21S	505
58	horizontal location from mining seismic network - error 20 meters	505

Data Set 3, Event 68

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991097	Apr 7,1991	8:35:13.082	51.5583	16.0754	0.9750	-	-	-	-	2.27	qmt	285	WIEJACZ

GEC2 3.115 28.41 210.23

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:36:3.380	21	13.2	20.0	6	0.3	805
Pg	Pg	8:36:9.675	29	16.0	15.9	3	0.2	806
Px	Px	8:36:15.400	22	16.0	11.3	4	0.2	807
Px	Px	8:36:21.100	31	17.2	3.0	4	0.4	801
Lg	Sx	8:36:50.928	28	25.8	5.3	16	0.5	802
Sx	Lg	8:36:57.250	27	27.0	3.6	21	0.5	803

NRA0 9.538 162.67 346.44

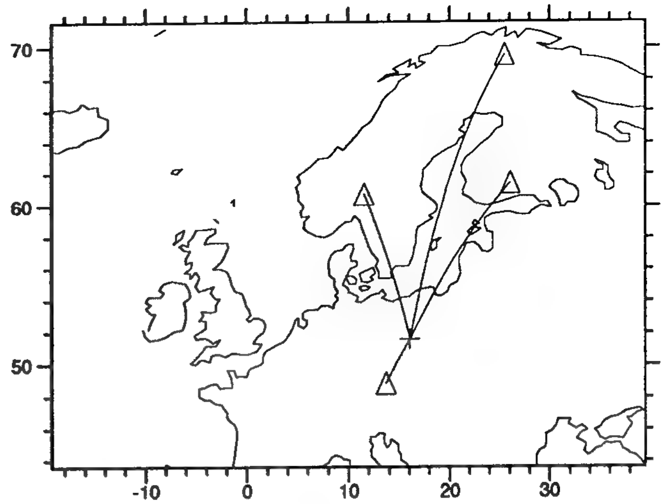
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:37:28.857	151	11.7	9.9	0	0.2	810
Px	Px	8:37:34.120	159	13.7	4.4	0	0.2	811
Sn	Sx	8:39:11.682	169	24.9	2.5	1	0.2	809

FIA0 11.328 213.50 25.14

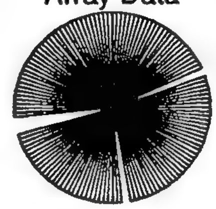
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	8:37:53.796	216	11.6	11.6	1	0.2	808
Sn	Sn	8:39:55.596	-1	-1.0	-1.0	-1	-1.0	1512

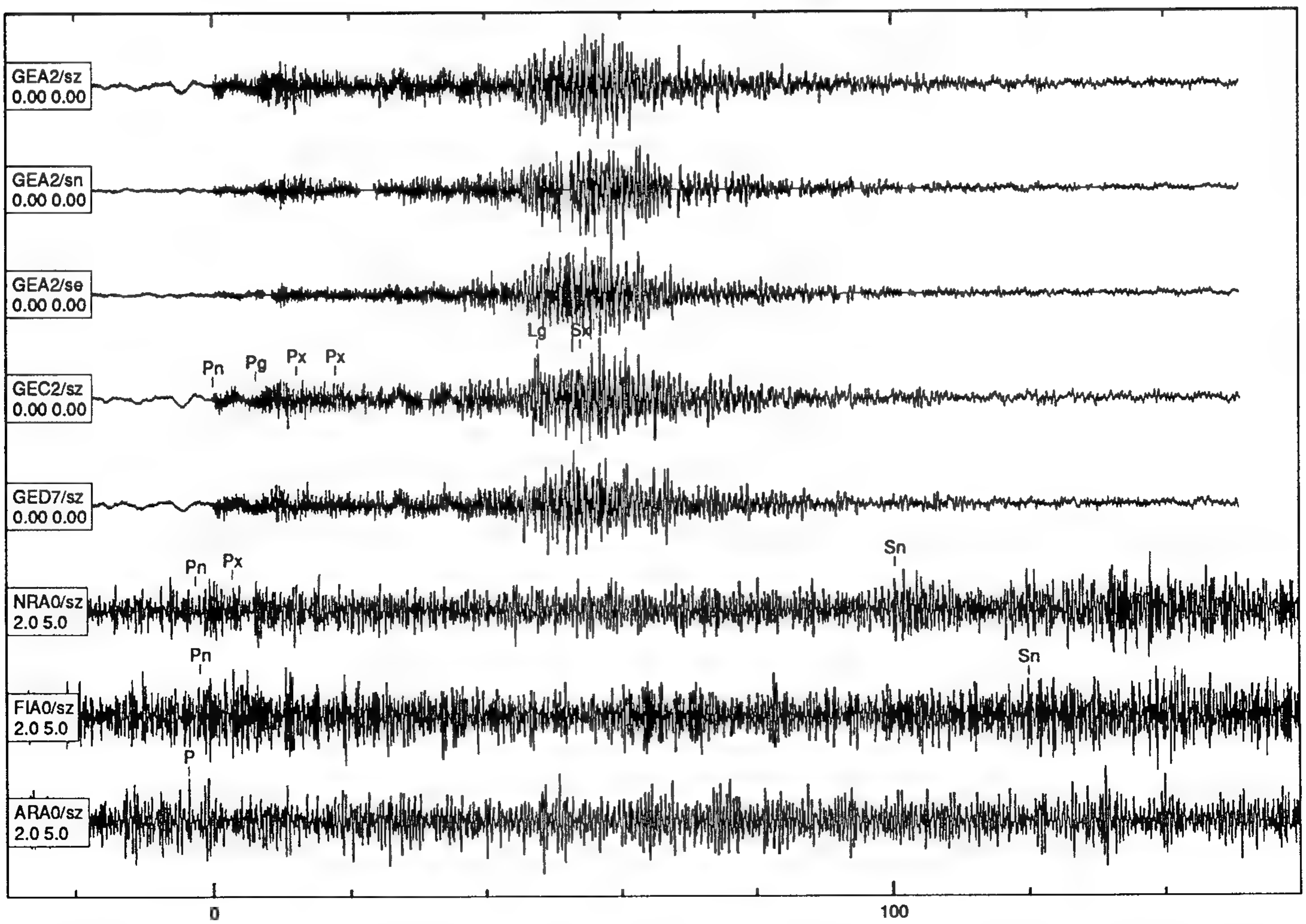
ARA0 18.579 198.73 10.42

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	8:39:27.274	191	12.1	6.7	0	0.2	812



Array Data GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
69	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
52	Rudna (Center); Field Descriptor G-7/2	505
58	horizontal location from mining seismic network - error20meters	505

Data Set 3, Event 69

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991108	Apr 18,1991	4:37:39.946	51.4877	16.1148	1.0500	-	-	-	-	2.81	qmt	286	WIEJACZ

GEC2 3.067 29.48 211.33

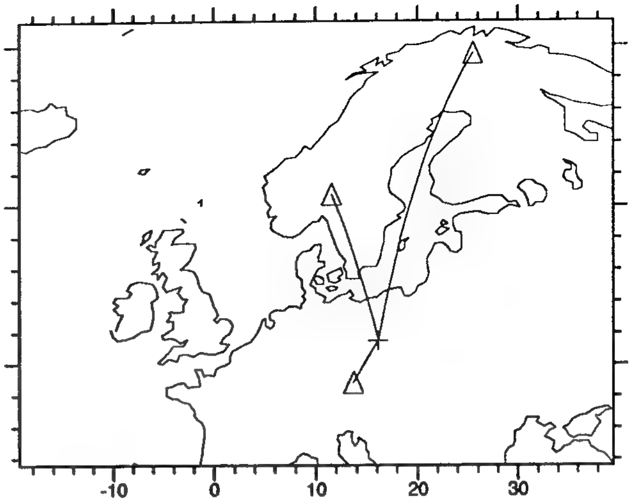
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:38:29.630	30	12.0	40.8	5	0.4	821
Pg	Pg	4:38:36.155	28	17.5	15.1	8	0.4	822
Px	Px	4:38:42.075	16	17.2	8.6	2	0.4	823
Lg	Sx	4:39:17.855	21	26.9	7.0	8	0.2	824
Sx	Lg	4:39:20.800	31	25.9	4.4	18	0.6	825

NRA0 9.613 162.63 346.43

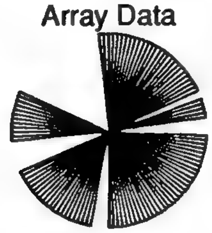
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	4:39:58.207	166	13.2	9.5	1	0.3	826
Sn	Sn	4:41:41.002	168	24.2	2.6	2	0.4	827

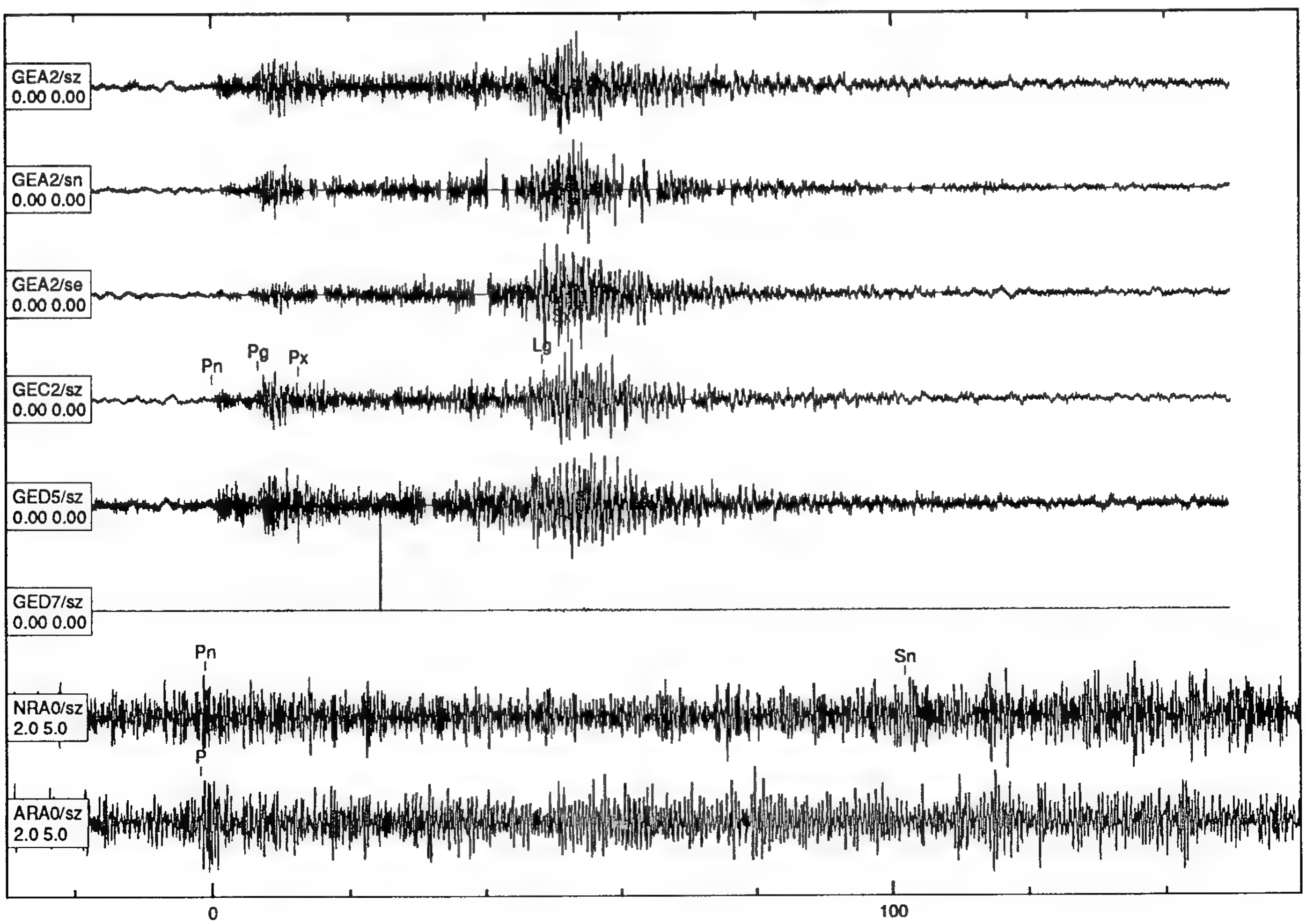
ARA0 18.644 198.61 10.34

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	4:41:56.732	196	10.7	9.8	1	0.4	828



Array Data GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
70	#3: LUBIN	qmt

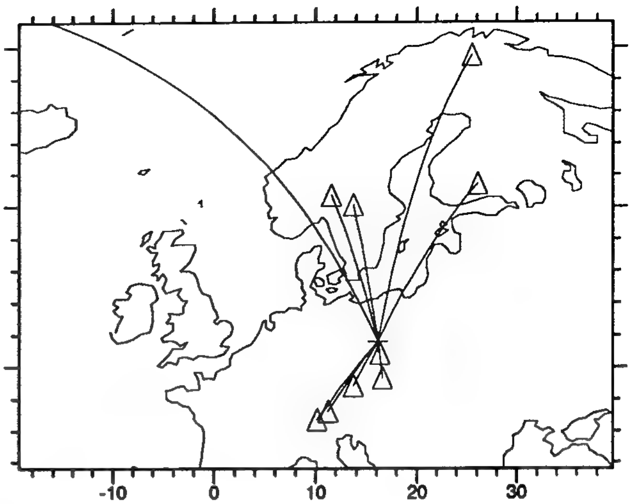
attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

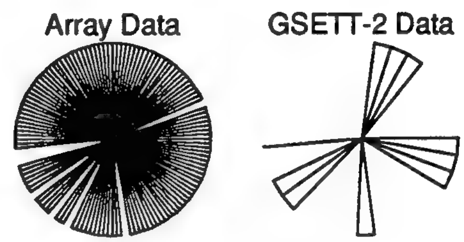
noteid	Notes	refid
54	Rudna (West); Field Descriptor G12/3	505
58	horizontal location from mining seismic network-error20meters	505

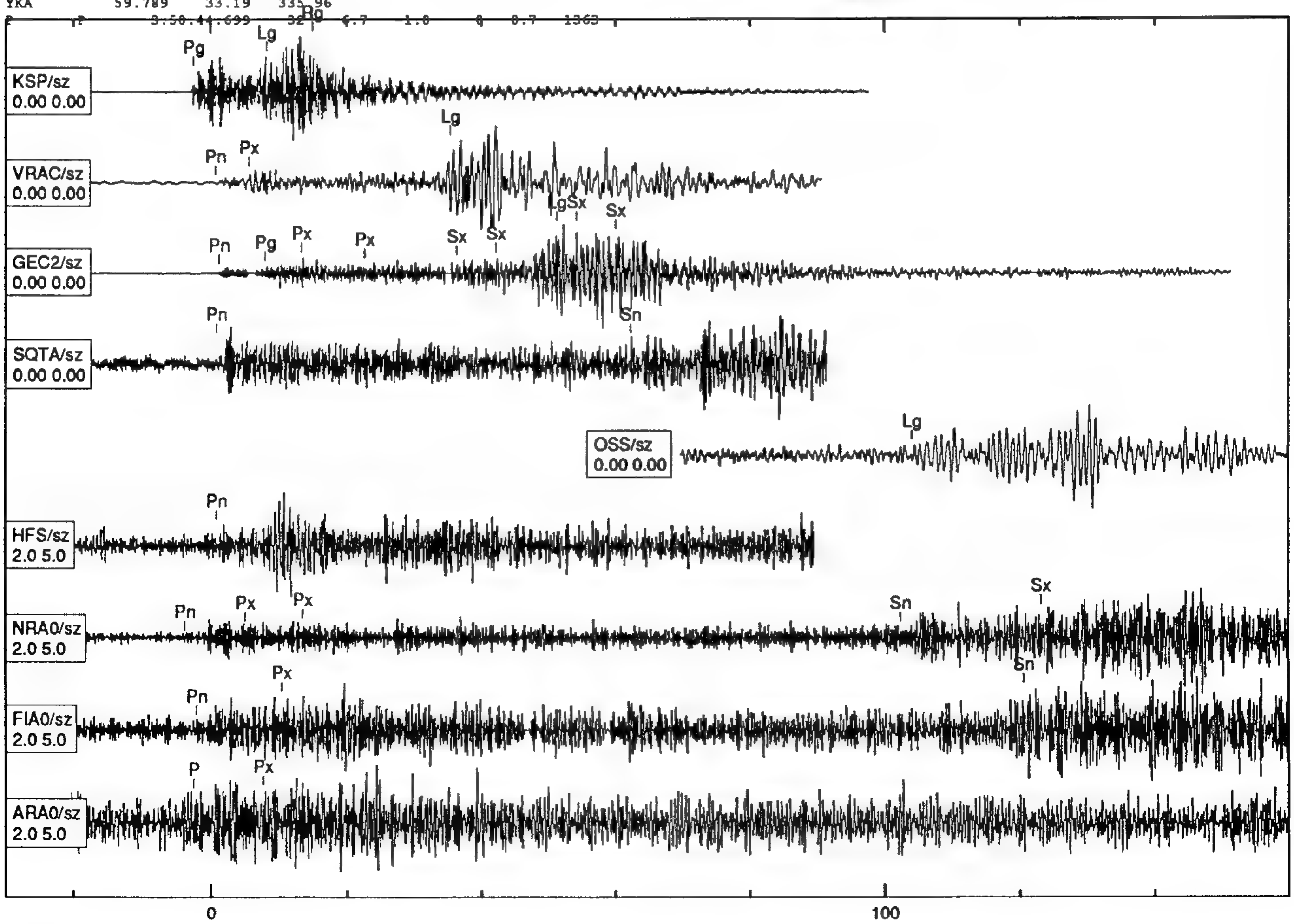
Data Set 3, Event 70

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991120	Apr 30,1991	3:40:36.868	51.5823	16.0969	1.0700	-	-	-	-	2.97	qmt	287	WIEJACZ

KSP		0.750	350.60	170.44				
Phase	Iphase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	3:40:52.102	117	2.1	-1.0	[illegible]	0.4	1506
Lg	Lg	3:41:2.775	168	3.4	-1.0	160	0.2	1507
Rg	Rg	3:41:9.625	-1	-1.0	-1.0	-1	-1.0	1513
VRAC		2.299	352.22	171.84				
Pn	Pn	3:41:16.602	-1	-1.0	-1.0	94	0.7	1357
Px	Pg	3:41:21.500	353	-1.0	-1.0	287	1.2	1358
Lg	Sg	3:41:51.264	-1	-1.0	-1.0	932	0.8	1359
GEC2		3.143	28.40	210.24				
Pn	Pn	3:41:28.628	31	12.8	103.4	9	0.4	837
Pg	Pg	3:41:35.425	36	15.6	48.9	19	0.2	838
Px	Px	3:41:40.725	28	16.3	12.8	7	0.3	839
Px	Pn	3:41:50.125	27	17.2	4.0	15	0.3	840
Sx	Sx	3:42:3.752	22	21.5	4.5	18	0.8	841
Sx	Sx	3:42:9.650	16	19.6	3.2	50	0.7	842
Lg	Sx	3:42:18.689	34	26.7	8.9	99	0.3	843
Sx	Lg	3:42:21.575	35	29.5	6.1	151	0.8	844
Sx	Lg	3:42:27.500	36	24.6	3.1	122	0.5	845
SQTA		5.407	34.35	218.06				
Pn	Pn	3:41:59.410	-1	-1.0	-1.0	[illegible]	0.2	1360
Sn	Sn	3:43:0.801	-1	-1.0	-1.0	-1	-1.0	1361
OSS		6.265	36.37	220.87				
Lg	Lg	3:43:54.301	-1	-1.0	-1.0	23	0.8	1373
HFS		8.678	170.02	352.01				
Pn	Pn	3:42:44.050	-1	-1.0	-1.0	-1	-1.0	1584
NRA0		9.518	162.56	346.35				
Pn	Pn	3:42:51.199	157	12.9	33.0	1	0.2	846
Px	Px	3:43:0.088	157	11.3	5.7	[illegible]	0.3	847
Px	Px	3:43:8.513	152	11.1	2.4	1	0.2	848
Sn	Sn	3:44:37.424	166	24.6	3.2	1	0.2	851
Sx	Sx	3:44:57.988	158	27.6	2.5	3	0.4	853
Sx	Sx	3:45:41.588	169	27.7	3.5	14	0.6	856
Sx	Sx	3:45:55.963	164	26.9	3.6	20	0.6	857
FIA0		11.301	213.49	25.15				
Pn	Pn	3:43:16.954	212	11.0	12.9	1	0.2	849
Px	Px	3:43:29.300	212	10.4	5.4	2	0.3	850
Sn	Sn	3:45:19.504	213	23.7	6.8	1	0.2	855
ARA0		18.553	198.70	10.41				
P	Pn	3:44:51.922	197	12.5	15.2	1	0.3	852
Px	Px	3:45:1.849	192	13.3	5.2	0	0.2	854
YKA		59.789	33.19	335.96				
P	P	3:50:44.699	32	6.7	-1.0	0	0.7	1363







filtered as noted

Event Number	Dataset Name	Event Type
71	#3: LUBIN	qmt

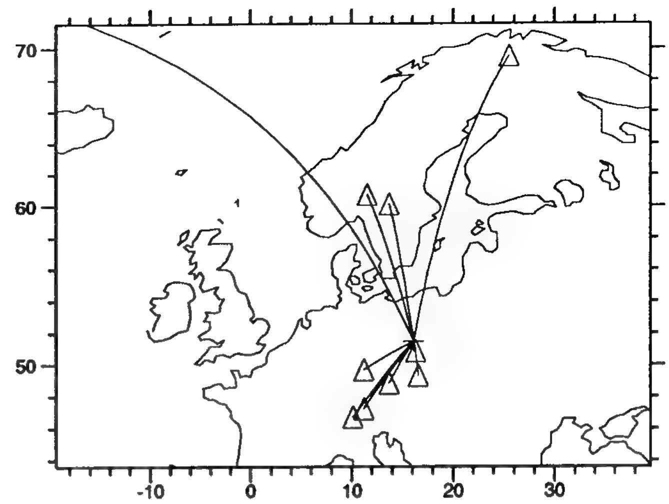
attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
46	Polkowice (East); Field Descriptor G-22	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 71

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991127	May 7,1991	3:02:45.095	51.4597	16.0967	0.7240	-	-	-	-	2.74	qmt	302	WIEJACZ

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
KSP	0.630	348.73	168.58					
Pg	Pg	3:02:58.525	345	16.6	-1.0	67	0.2	1533
Lg	Lg	3:03:7.350	-1	-1.0	-1.0	-1	-1.0	1556
Rg	Rg	3:03:14.700	-1	-1.0	-1.0	-1	-1.0	1557
VRAC	2.177	351.76	171.38					
Pn	Pn	3:03:23.694	327	-1.0	-1.0	-1	-1.0	1385
Px	UNK	3:03:30.199	-1	-1.0	-1.0	-1	-1.0	1386
Sn	Sn	3:03:51.699	-1	-1.0	-1.0	-1	-1.0	1387
Lg	Lg	3:03:57.054	-1	-1.0	-1.0	66973	0.7	1388
GEC2	3.037	29.57	211.40					
Pn	Pn	3:03:34.932	36	15.8	295.2	21	0.3	868
Pg	Pg	3:03:41.707	32	18.1	66.1	16	0.4	869
Lg	Lg	3:04:26.457	31	26.3	5.7	30	0.5	872
GRA1	3.576	58.48	242.23					
Pn	Pn	3:03:42.600	-1	-1.0	-1.0	27	1.1	1389
Px	Pg	3:03:55.600	-1	-1.0	-1.0	[illegible]	0.9	1390
Lg	Lg	3:04:43.450	-1	-1.0	-1.0	65	0.9	1391
SQTA	5.311	35.17	218.87					
Pn	PP	3:04:7.480	-1	-1.0	-1.0	4	0.2	1379
OSS	6.172	37.12	221.61					
Sx	Sx	3:06:14.100	-1	-1.0	-1.0	18	1.1	1377
HFS	8.799	170.13	352.12					
Pn	P	3:04:53.250	0	0.0	-1.0	2	0.4	1382
NRA0	9.637	162.73	346.52					
Pn	Pn	3:05:2.851	160	12.8	49.7	2	0.3	873
Px	Px	3:05:11.986	159	13.3	4.5	1	0.3	874
Px	Px	3:05:15.061	155	14.0	2.4	1	0.2	875
Sn	Sn	3:06:46.701	157	24.2	2.8	2	0.4	878
FIA0	11.412	213.23	24.89					
Pn	Pn	3:05:26.600	211	11.1	26.6	2	0.3	876
ARA0	18.674	198.63	10.35					
P	Pn	3:07:0.407	193	13.6	27.0	2	0.3	879
Px	Px	3:07:7.403	201	12.4	4.3	0	0.3	880
YKA	59.901	33.25	335.99					
P	P	3:12:52.900	32	6.8	-1.0	0	0.5	1376



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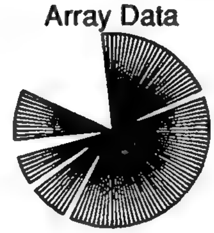
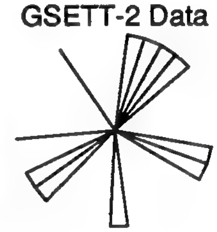
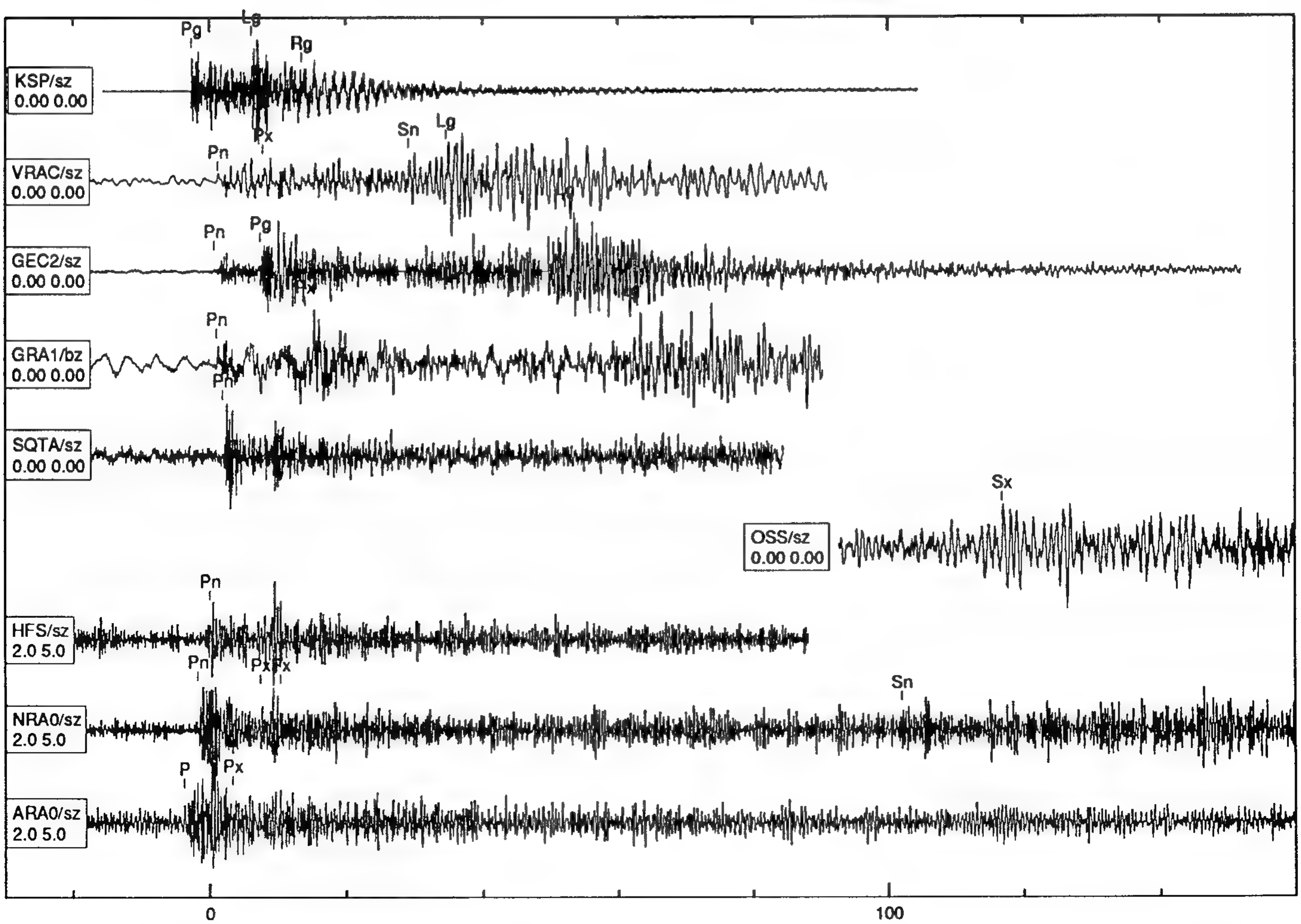


GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
72	#3: LUBIN	qmt

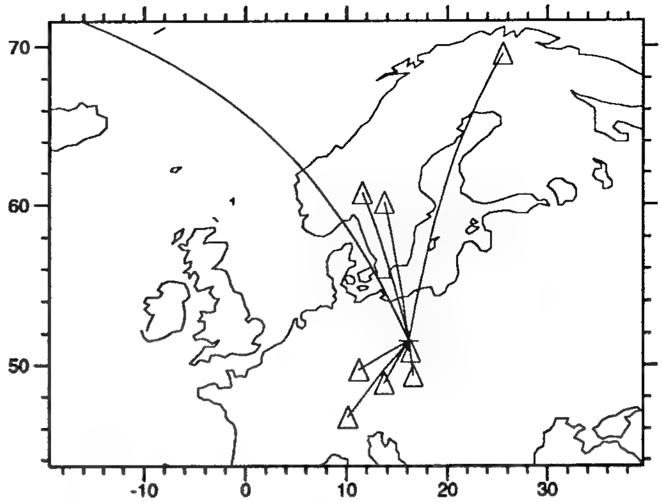
attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
47	Polkowice (East); Field Descriptor G-23FILAR	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 72

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991138	May 18,1991	11:15:40.689	51.4804	16.1122	0.8500	-	-	-	-	2.50	qmt	301	WIEJACZ

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
KSP	0.648	349.93	169.79					
Pg	Pg	11:15:54.150	-1	-1.0	-1.0	-1	-1.0	1558
Lg	Lg	11:16:3.703	-1	-1.0	-1.0	112	0.3	1534
Rg	Rg	11:16:10.000	-1	-1.0	-1.0	-1	-1.0	1559
VRAC	2.196	352.09	171.72					
Pn	Pn	11:16:19.702	206	-1.0	-1.0	25616	1.1	1403
Lg	Lg	11:16:53.022	-1	-1.0	-1.0	-1	-1.0	1404
GEC2	3.060	29.52	211.37					
Pn	Pg	11:16:30.825	31	12.5	105.0	11	0.3	885
Pg	Rg	11:16:37.738	32	31.9	30.3	35	1.1	886
Px	Pn	11:16:44.775	12	17.4	7.6	4	0.4	887
Lg	Lg	11:17:19.294	23	26.5	7.2	31	0.6	888
Sx	Sx	11:17:28.023	38	26.4	4.1	8	0.6	889
GRA1	3.594	58.26	242.03					
Pn	Pn	11:16:38.797	-1	-1.0	-1.0	10	0.6	1398
Pg	Pg	11:16:52.102	-1	-1.0	-1.0	33	0.8	1399
Lg	S	11:17:37.000	-1	-1.0	-1.0	45	1.1	1400
OSS	6.194	37.06	221.56					
Sx	Sx	11:19:21.102	-1	-1.0	-1.0	18	1.0	1392
HFS	8.780	170.05	352.05					
Pn	P	11:17:48.050	179	14.6	-1.0	0	0.3	1406
NRAO	9.619	162.65	346.45					
Pn	Pn	11:17:58.254	169	12.5	19.7	1	0.3	890
Sn	Sn	11:19:41.554	162	23.6	3.0	1	0.2	892
ARAO	18.652	198.61	10.34					
P	Pn	11:19:55.804	191	11.9	27.6	2	0.3	893
Px	Px	11:20:2.105	193	11.6	5.8	1	0.3	894
YKA	59.886	33.23	335.99					
P	P	11:25:48.297	32	6.6	-1.0	0	0.8	1395



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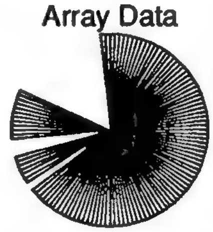
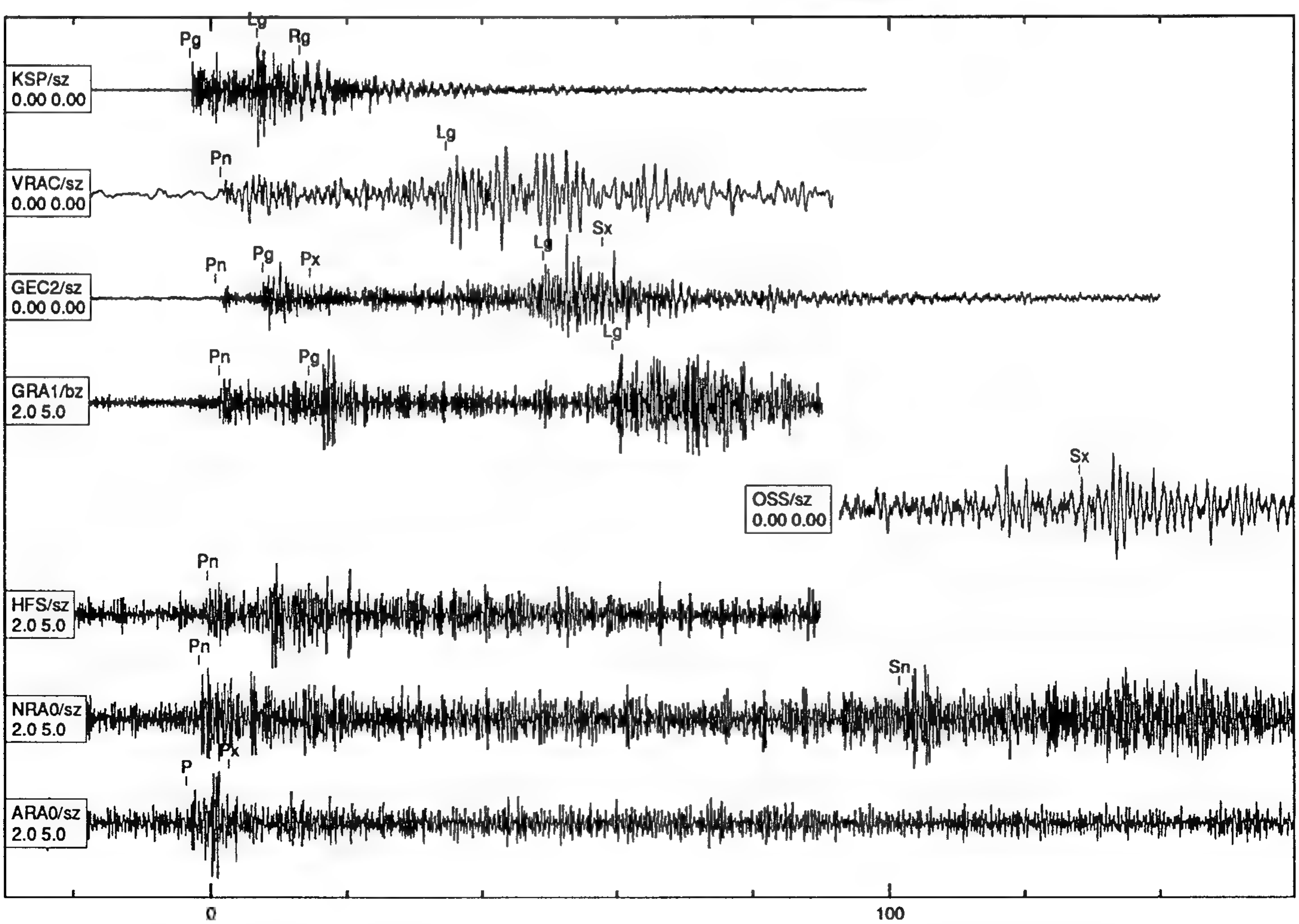


GSETT-2 Data



filtered as noted

Event Number	Dataset Name	Event Type
73	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Sieroszowice	505

noteid	Notes	refid
55	Sieroszowice (East); Field Descriptor G-21S	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 73

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991141	May 21,1991	23:15:54.256	51.5586	16.0750	0.9740	-	-	-	-	2.97	qmt	288	WIEJACZ

VRAC 2.277 351.80 171.40

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pg	23:16:33.715	305	-1.0	-1.0	-1	-1.0	1410
Lg	Lg	23:17:6.594	-1	-1.0	-1.0	31081	0.6	1411

GEC2 3.115 28.41 210.23

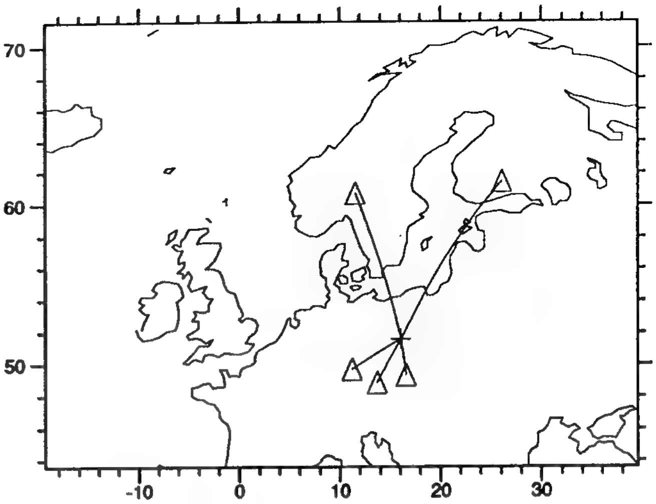
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:16:44.019	24	13.3	37.7	1	0.1	897
Pg	Pg	23:16:50.774	30	16.7	12.8	4	0.3	898
Px	Px	23:16:59.100	21	16.3	8.7	2	0.3	899
Sx	Sx	23:17:24.075	17	27.9	4.1	2	0.4	903
Lg	Lg	23:17:32.193	32	23.1	6.9	16	0.5	904
Sx	Sx	23:17:37.624	43	30.8	5.5	5	0.5	906
Sx	Sx	23:17:43.949	33	24.8	5.0	7	0.4	907

NRA0 9.538 162.67 346.44

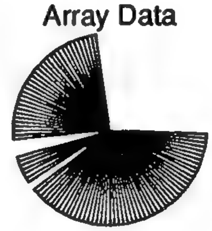
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:18:10.796	148	12.6	5.1	0	0.2	908
Sn	Sn	23:19:52.696	-1	-1.0	-1.0	-1	-1.0	1514

FIA0 11.328 213.50 25.14

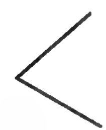
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:18:35.017	217	11.8	9.6	1	0.2	909
Px	P	23:18:39.450	233	3.1	4.7	0	0.2	910
Sn	Sn	23:20:36.992	-1	-1.0	-1.0	-1	-1.0	1515

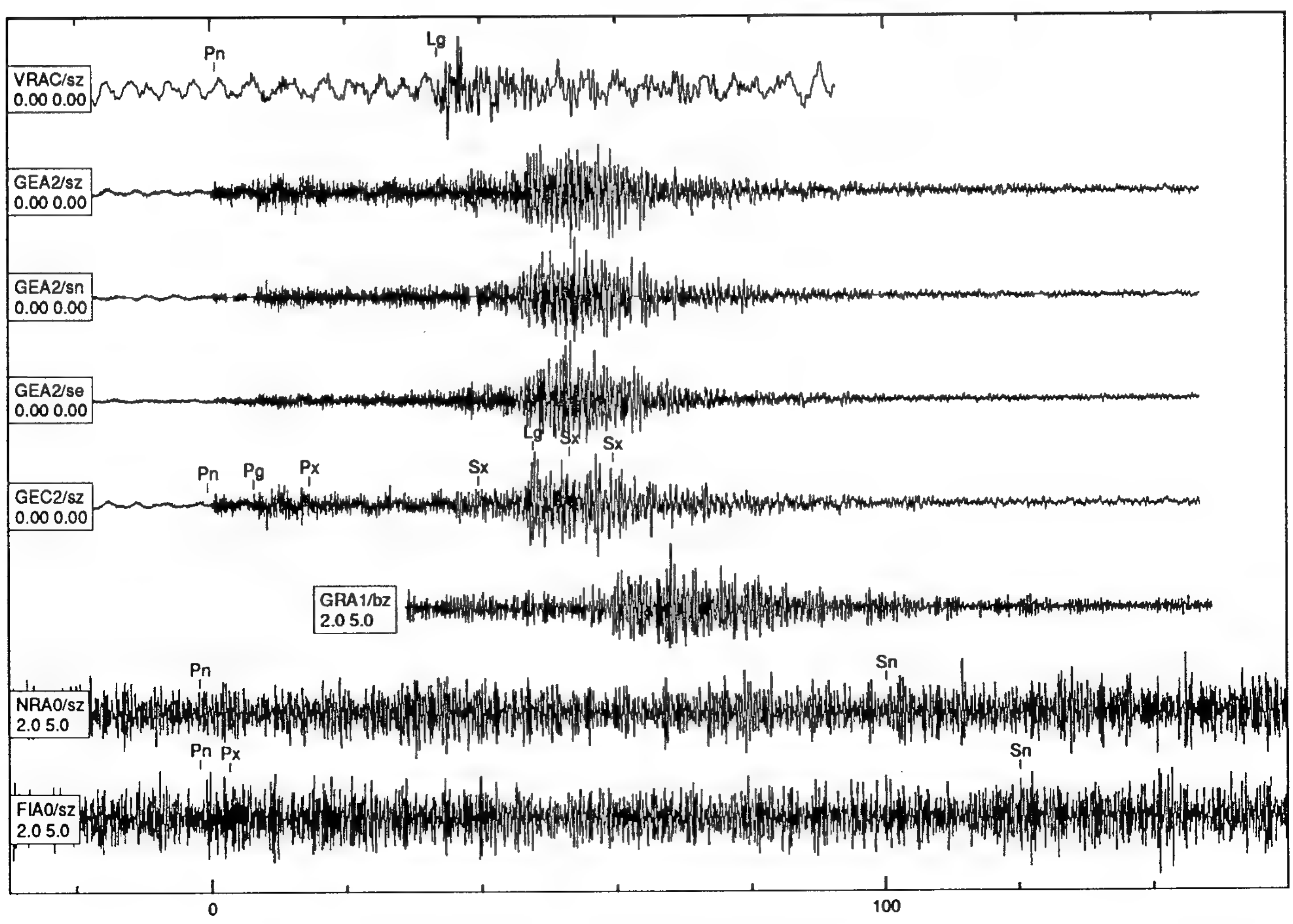


Array Data



GSETT-2 Data





Event Number	Dataset Name	Event Type
74	#3: LUBIN	qmt

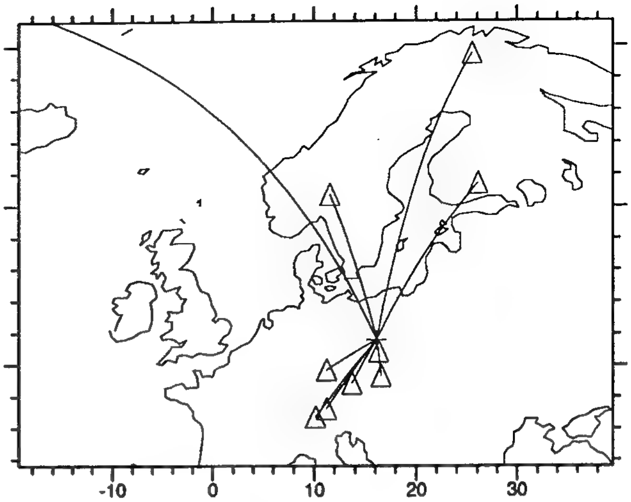
attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
53	Rudna (West); Field Descriptor G-11/6	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 74

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991143	May 23,1991	19:42:53.283	51.5587	16.1155	1.1500	-	-	-	-	2.79	qmt	303	WIEJACZ

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
KSP	0.725	351.19	171.05					
Pg	Pg	19:43:6.950	326	9.1	-1.0	62	0.3	1537
Lg	Lg	19:43:16.797	-1	-1.0	-1.0	164	0.7	1538
Rg	Rg	19:43:24.406	-1	-1.0	-1.0	2399550	1.7	1539
VRAC	2.274	352.43	172.06					
Pn	Pn	19:43:31.746	311	-1.0	-1.0	-1	-1.0	1418
Px	Px	19:43:35.297	-1	-1.0	-1.0	49779	0.6	1419
Px	Px	19:43:39.797	-1	-1.0	-1.0	30798	1.4	1420
Sx	Sx	19:44:3.406	-1	-1.0	-1.0	-1	-1.0	1421
Lg	Lg	19:44:7.026	-1	-1.0	-1.0	159546	0.7	1422
GEC2	3.128	28.81	210.66					
Pn	Pn	19:43:43.093	32	13.7	212.7	23	0.4	914
Pg	Px	19:43:50.098	34	17.7	44.4	38	0.7	915
Px	Px	19:43:56.650	22	16.0	10.5	5	0.3	916
Lg	Rg	19:44:33.098	30	27.5	7.0	148	0.8	917
GRA1	3.633	57.18	240.95					
Pn	Pn	19:43:50.700	-1	-1.0	-1.0	-1	-1.0	1561
Lg	Lg	19:44:50.300	-1	-1.0	-1.0	-1	-1.0	1560
SQTA	5.395	34.60	218.32					
Pn	Pn	19:44:16.530	-1	-1.0	-1.0	2	0.2	1424
Lg	Lg	19:45:48.970	-1	-1.0	-1.0	21	0.5	1425
OSS	6.254	36.60	221.11					
Sx	Sx	19:45:53.703	-1	-1.0	-1.0	12	0.9	1416
NRA0	9.544	162.53	346.33					
Pn	Pn	19:45:9.996	170	12.4	10.2	2	0.4	920
Px	Px	19:45:16.922	160	11.9	4.9	0	0.2	921
Sn	Sn	19:46:52.771	-1	-1.0	-1.0	-1	-1.0	1562
FIA0	11.318	213.39	25.06					
Pn	Pn	19:45:34.473	213	11.4	9.1	1	0.3	922
Sn	Sn	19:47:36.773	212	21.9	2.7	1	0.2	926
ARA0	18.574	198.65	10.38					
P	Pn	19:47:8.062	195	11.7	12.5	2	0.4	924
Px	Px	19:47:15.788	188	12.1	4.2	0	0.3	925
YKA	59.815	33.19	335.98					
P	P	19:53:0.203	32	6.8	-1.0	0	0.7	1585



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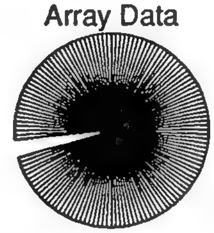
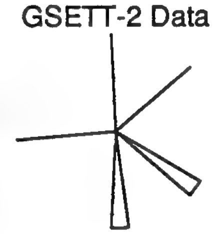
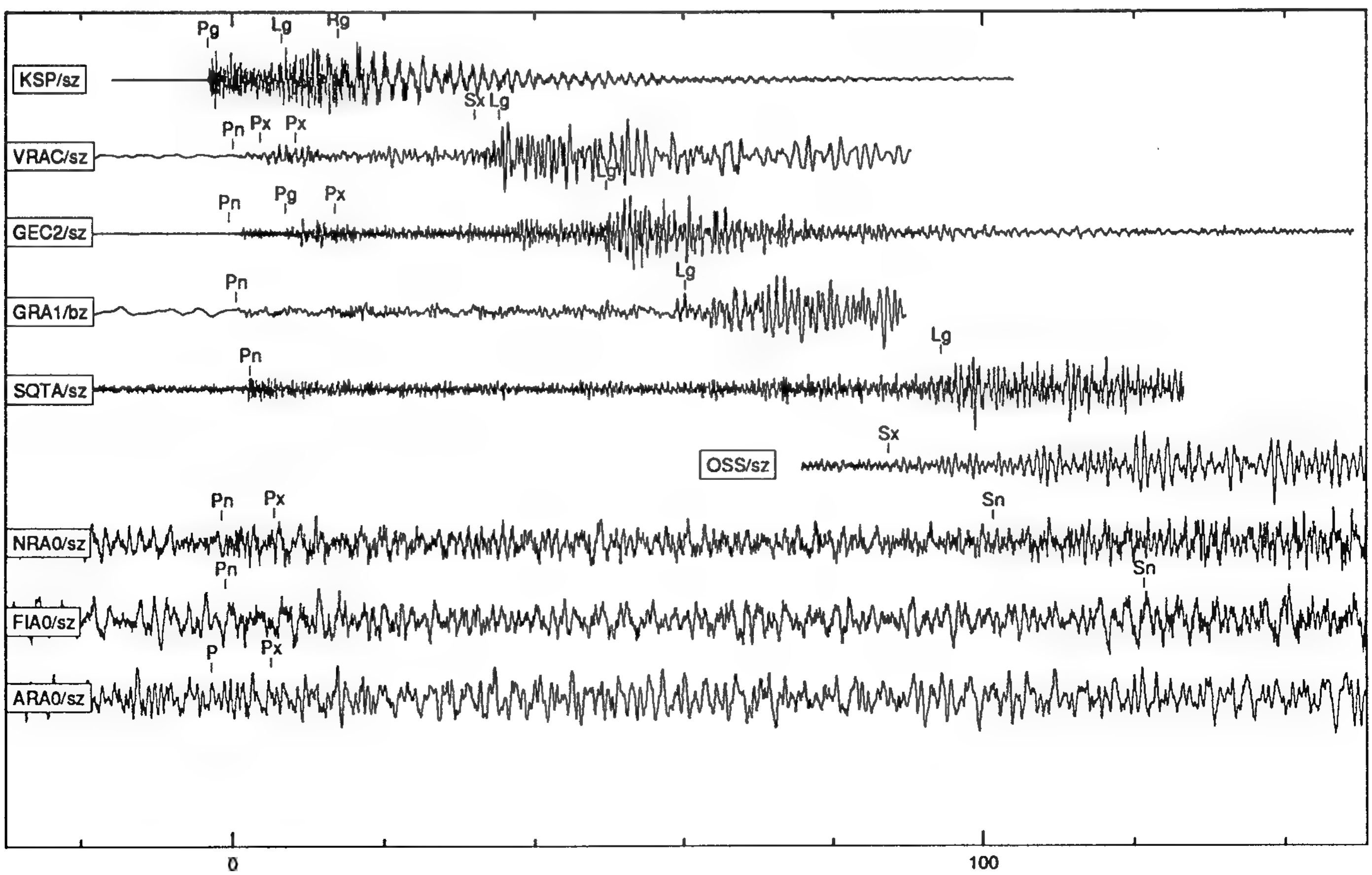


GSETT-2 Data





unfiltered

Event Number	Dataset Name	Event Type
75	#3: LUBIN	qmt

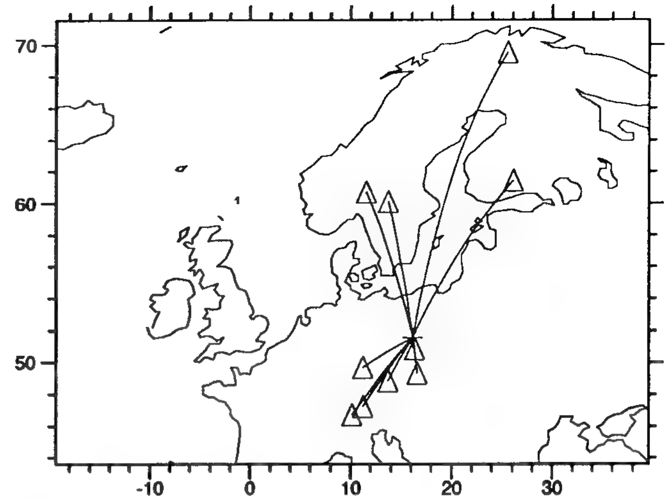
attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

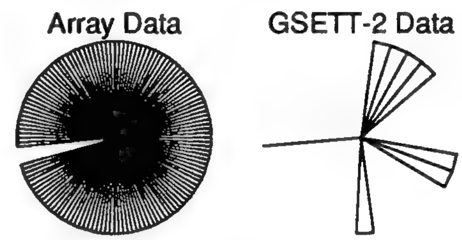
noteid	Notes	refid
51	Rudna (Center); Field Descriptor G-6/4	505
58	horizontal location from mining seismic network-error 20 meters	505

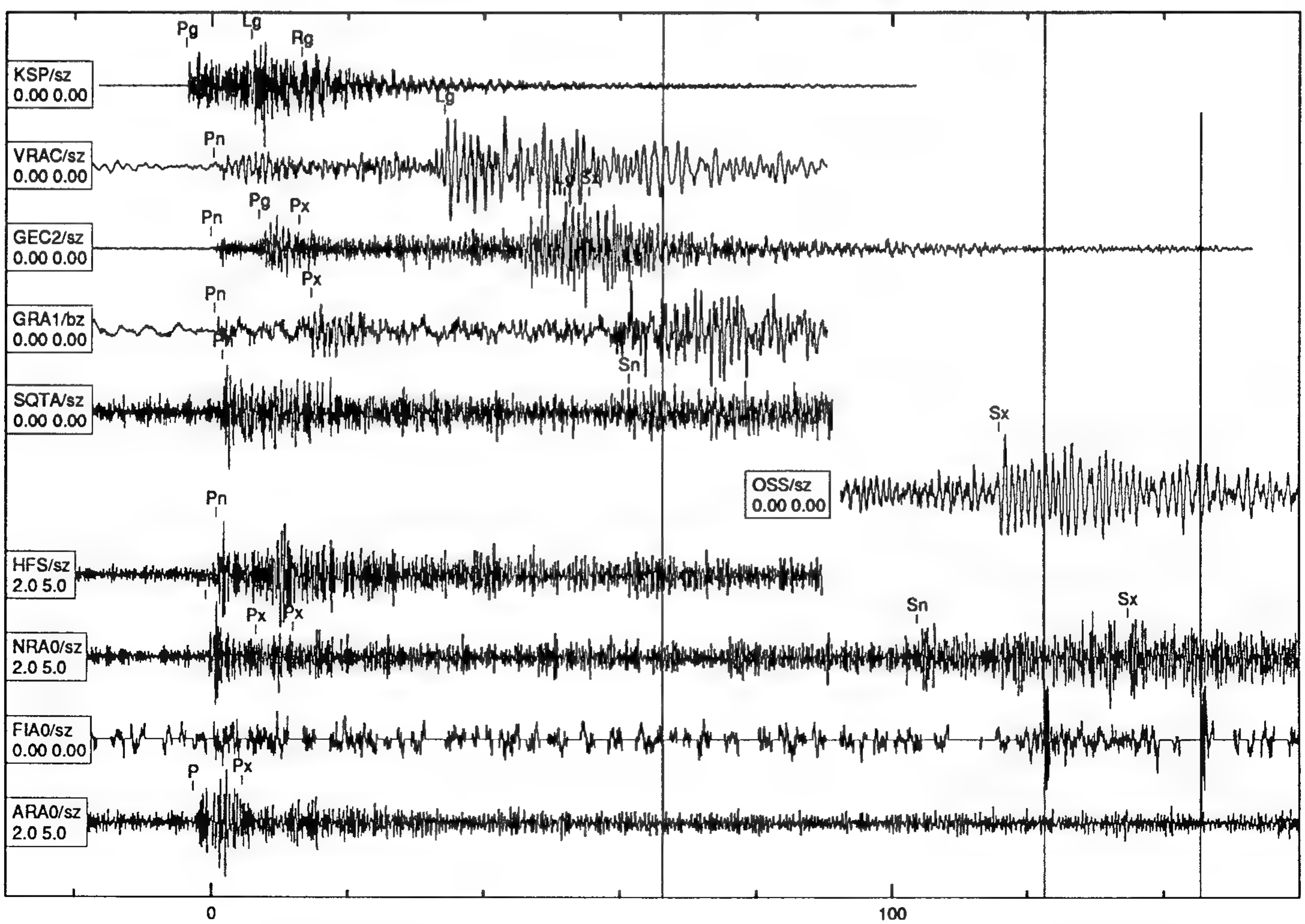
Data Set 3, Event 75

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991148	May 28,1991	3:52:48.297	51.5581	16.1158	1.1000	-	-	-	-	2.71	qmt	304	WIEJACZ

KSP		0.724	351.20	171.06				
Pg	Pg	3:53:1.975	72	20.6	-1.0	39	0.3	1545
Lg	Lg	3:53:11.398	-1	-1.0	-1.0	106	0.6	1546
Rg	Rg	3:53:18.750	-1	-1.0	-1.0708980		1.7	1547
VRAC		2.273	352.43	172.06				
Pn	Pn	3:53:27.199	18	-1.0	-1.0	7938	2.2	1438
Lg	Sg	3:54:1.151	-1	-1.0	-1.0	75775	1.1	1439
GEC2		3.128	28.81	210.66				
Pn	Pn	3:53:38.550	30	12.8	154.9	20	0.4	938
Pg	Px	3:53:45.623	30	17.7	46.1	24	0.6	939
Px	Pg	3:53:51.475	21	17.1	8.6	3	0.3	940
Lg	Sn	3:54:30.574	37	26.5	7.4	39	0.5	941
Sx	Sx	3:54:34.148	42	31.6	3.8	41	0.5	942
GRA1		3.633	57.19	240.96				
Pn	Pn	3:53:45.950	-1	-1.0	-1.0	12	0.7	1440
Px	-	3:54:0.100	-1	-1.0	-1.0	41	0.8	1441
Lg	-	3:54:47.400	-1	-1.0	-1.0	42	0.6	1442
SQTA		5.395	34.61	218.33				
Pn	P	3:54:11.300	-1	-1.0	-1.0	4	0.3	1436
Sn	Sn	3:55:11.140	-1	-1.0	-1.0	-1	-1.0	1563
OSS		6.254	36.60	221.11				
Sx	Sx	3:56:17.301	-1	-1.0	-1.0	25	1.0	1435
HFS		8.703	169.97	351.97				
Pn	P	3:54:55.800	160	13.5	-1.0	2	0.3	1432
NRA0		9.544	162.53	346.33				
Pn	Pn	3:55:5.810	165	12.7	38.3	2	0.3	943
Px	Px	3:55:13.090	147	11.3	4.3	0	0.3	944
Px	Px	3:55:18.515	147	13.3	2.5	1	0.2	945
Sn	Sn	3:56:50.190	167	23.0	3.9	3	0.4	946
Sx	Sx	3:57:21.215	163	27.3	2.6	3	0.4	949
ARA0		18.575	198.65	10.38				
P	Pn	3:57:3.376	191	13.8	31.0	2	0.3	947
Px	Px	3:57:10.476	208	12.6	4.5	1	0.4	948
YKA		59.816	33.19	335.98				
P	P	4:02:55.898	34	6.5	-1.0	0	0.6	1431







filtered as noted

Event Number	Dataset Name	Event Type
76	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
58	horizontal location from mining seismic network-error 20 meters	505
56	mine tremor triggered by intentional blast	506

Data Set 3, Event 76

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991150	May 30,1991	21:18:23.023	51.4971	16.0767	0.8590	-	-	-	-	2.38	qmt	305	WIEJACZ

KSP 0.669 348.32 168.15

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	21:18:37.225	90	13.9	-1.0	10	0.2	1552
Lg	Lg	21:18:46.250	-1	-1.0	-1.0	16	0.5	1553
Rg	Rg	21:18:53.200	-1	-1.0	-1.0	63820	1.2	1554

GEC2 3.063 29.00 210.82

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	21:19:13.550	-1	-1.0	-1.0	-1	-1.0	1568
Pg	Pn	21:19:20.100	29	15.1	33.8	4	0.4	950
Px	Pg	21:19:22.450	27	15.1	14.9	2	0.3	951
Sn	Sn	21:19:50.537	-1	-1.0	-1.0	-1	-1.0	1564
Lg	Lg	21:20:1.987	30	30.3	4.6	4	0.5	952
Sx	Sx	21:20:9.098	26	25.7	3.2	6	0.7	953

GRA1 3.583 57.85 241.60

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	21:19:19.000	-1	-1.0	-1.0	-1	-1.0	1567
Px	P	21:19:35.100	-1	-1.0	-1.0	6	1.0	1451
Lg	Lg	21:20:18.800	-1	-1.0	-1.0	-1	-1.0	1565

NRA0 9.598 162.75 346.52

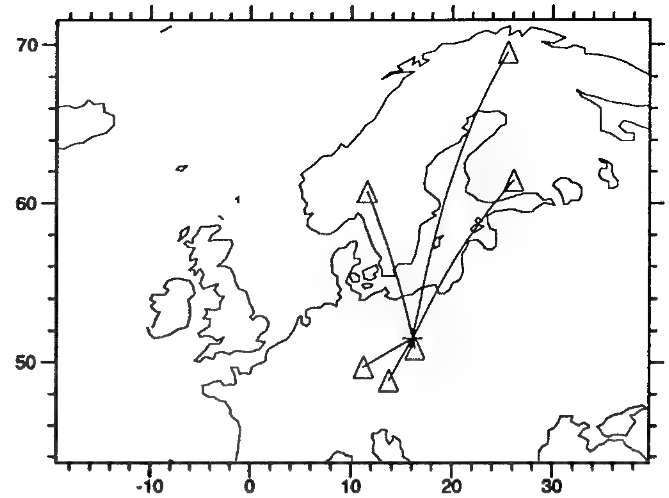
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	21:20:39.490	152	12.4	7.9	0	0.2	956

FIA0 11.384 213.37 25.01

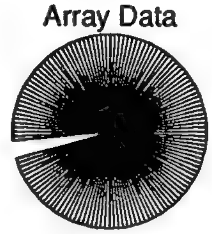
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	21:21:5.025	220	10.5	6.8	0	0.2	957

ARA0 18.639 198.69 10.39

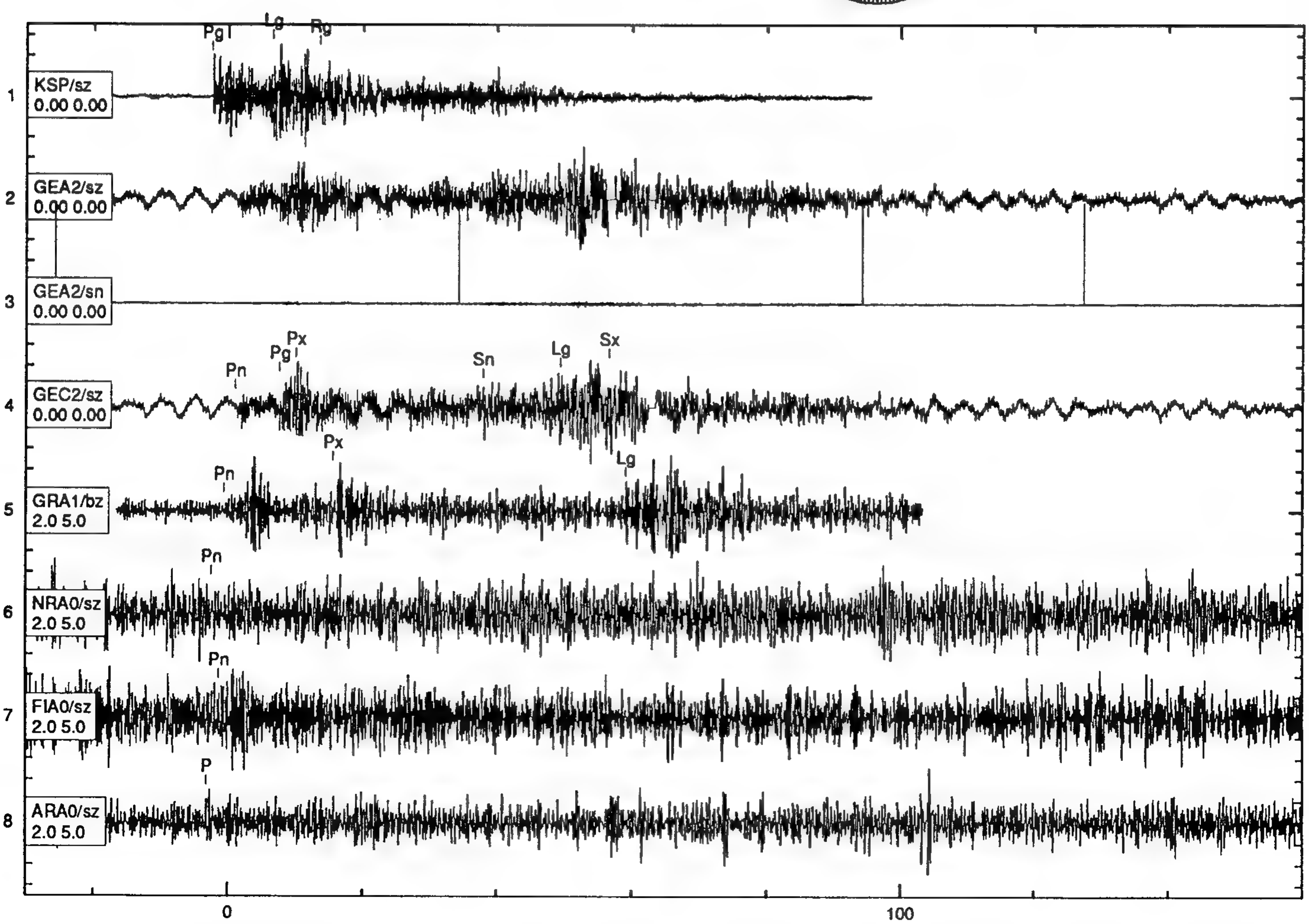
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	21:22:38.464	-1	-1.0	-1.0	-1	-1.0	1566



Array Data



GSETT-2 Data



filtered as noted

Event Number	Dataset Name	Event Type
77	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
50	Rudna (Center); Field Descriptor G-4/3	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 77

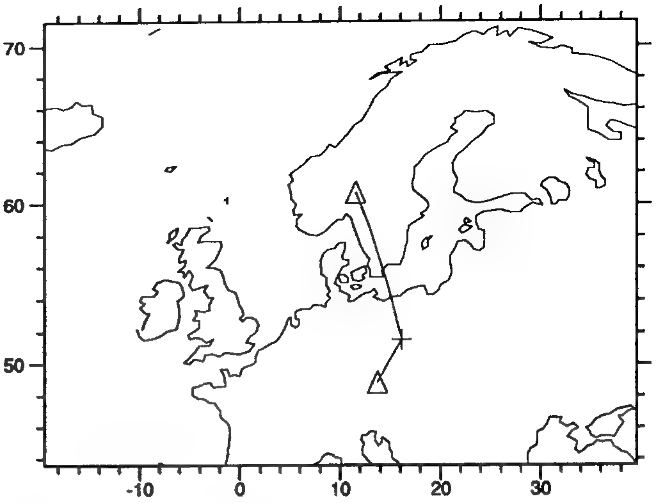
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991166	Jun 15,1991	12:51:27.760	51.5194	16.0891	0.9400	-	-	-	-	2.62	qmt	290	WIEJACZ

GEC2 3.086 28.92 210.74

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:52:19.591	18	15.3	25.7	2	0.3	996
Pg	Pg	12:52:25.484	31	15.6	13.9	2	0.3	997
Px	Px	12:52:32.600	34	15.3	5.6	1	0.3	998
Px	Pn	12:52:44.149	29	16.6	4.1	2	0.5	999
Lg	Lg	12:53:9.383	27	26.7	12.3	22	0.6	1001
Sx	Sx	12:53:10.874	37	24.7	7.5	6	0.5	1002
Sx	Sx	12:53:18.525	23	25.1	4.2	7	0.6	1003

NRA0 9.578 162.68 346.46

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:53:45.340	161	12.7	9.9	0	0.3	1004
Sn	Sn	12:55:28.732	-1	-1.0	-1.0	-1	-1.0	1516



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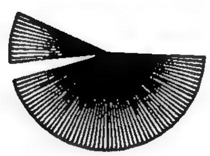
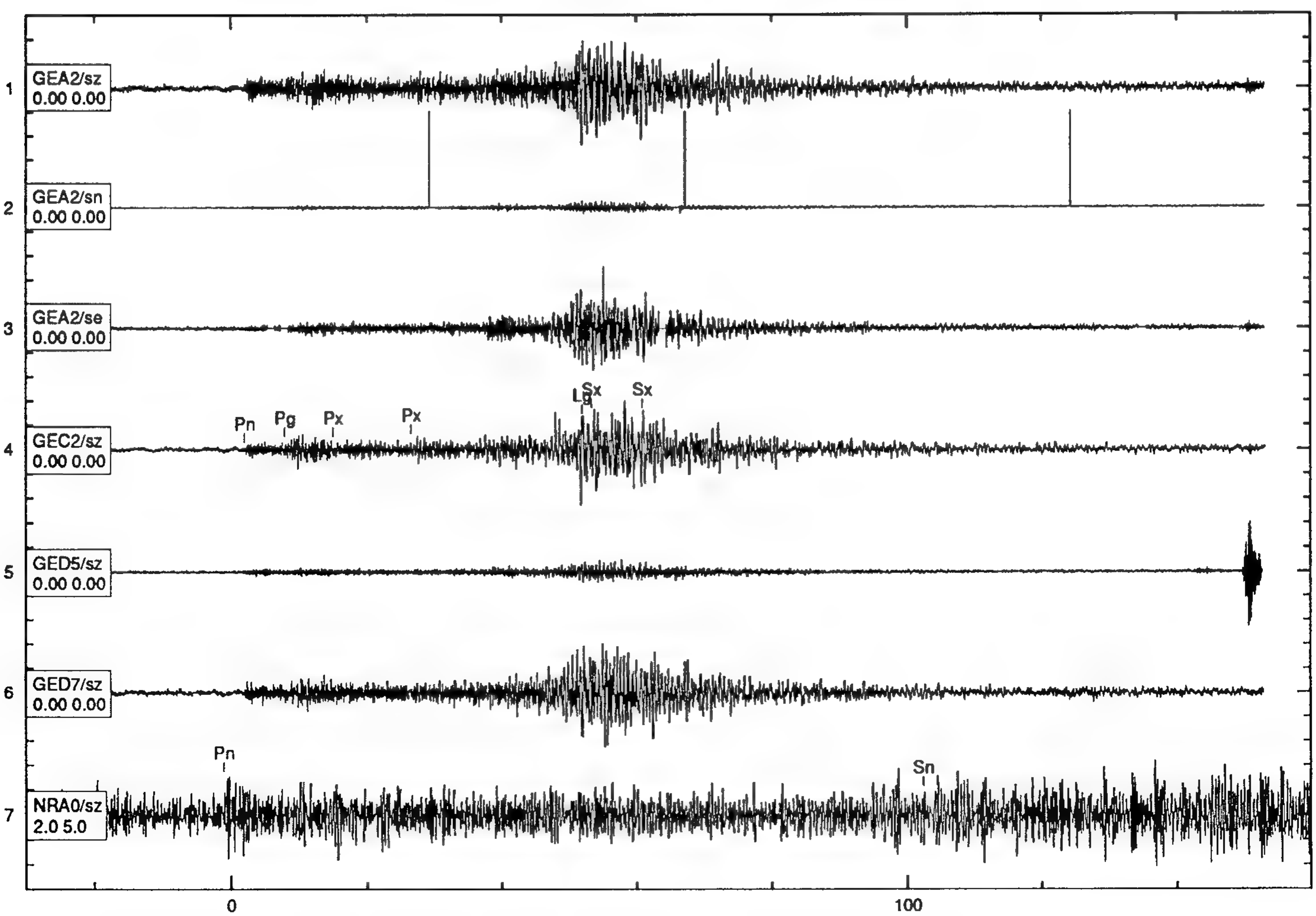




filtered as noted

Event Number	Dataset Name	Event Type
78	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Lubin	505

noteid	Notes	refid
40	Lubin (West); Field Descriptor G4-7/10	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 78

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991179	Jun 28,1991	2:32:56.723	51.4386	16.1247	0.7300	-	-	-	-	2.31	qmt	314	WIEJACZ

KSP 0.605 349.96 169.83

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	2:33:7.759	-1	-1.0	-1.0	-1	-1.0	1581
Lg	Lg	2:33:17.116	259	19.0	15.2	714	0.5	1009
Sx	Sx	2:33:22.475	228	19.7	3.6	488	0.4	1010
Rg	Rg	2:33:24.175	18	7.6	5.5	1648	1.3	1011

GEC2 3.028 30.06 211.92

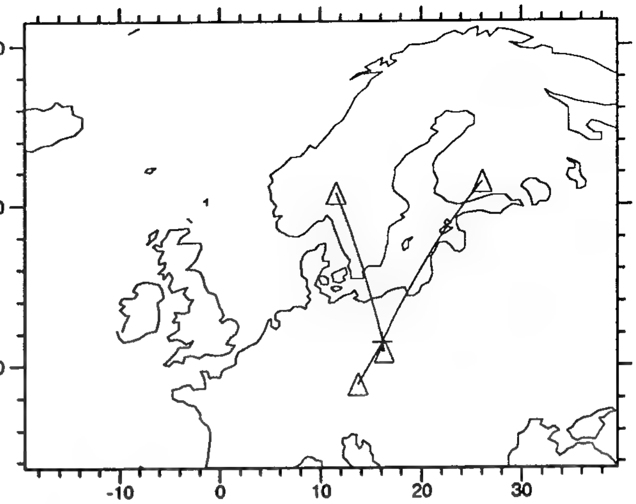
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	2:33:52.925	35	15.7	29.9	2	0.3	1012
Px	Pg	2:33:55.800	31	15.7	11.5	1	0.2	1013
Lg	Lg	2:34:36.470	27	26.4	3.1	3	0.6	1014
Pn	Pn	2:33:47.085	-1	-1.0	-1.0	-1	-1.0	1580

NRAO 9.662 162.66 346.47

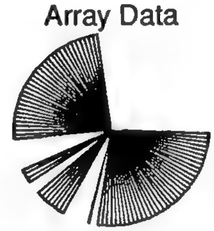
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	2:35:15.000	150	11.9	7.8	0	0.2	1015

FIAO 11.424 213.10 24.79

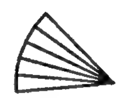
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	2:35:37.911	-1	-1.0	-1.0	-1	-1.0	1579

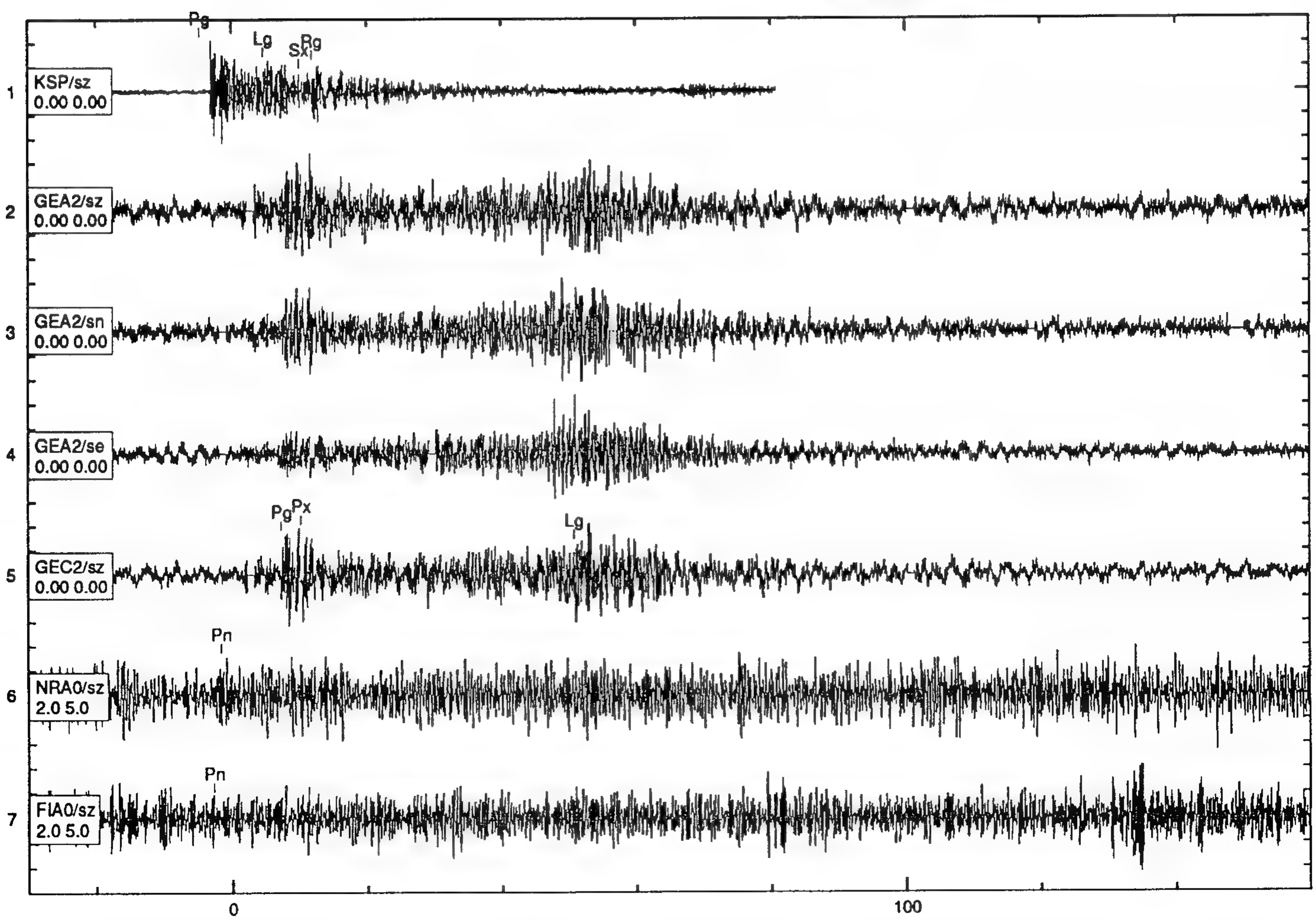


Array Data



GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
79	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
45	Polkowice (East); Field Descriptor G-21	505
59	horizontal location based on geographic center of mining field- error 500 meters	505
61	large amplitude variation accross array- possible error on GEB3/sz and GEA0/sz	504

Data Set 3, Event 79

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991191	Jul 10,1991	11:33:22.028	51.4400	16.1220	0.8500	-	-	-	-	3.03	qmt	291	WIEJACZ

KSP 0.607 349.83 169.69

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	11:33:34.550	350	15.2	200.2	8456	0.4	1021
Lg	Lg	11:33:43.750	211	18.2	12.3	6026	0.6	1022
Rg	Rg	11:33:49.575	3	9.5	17.8	37164	1.2	1023

GEC2 3.029 30.02 211.87

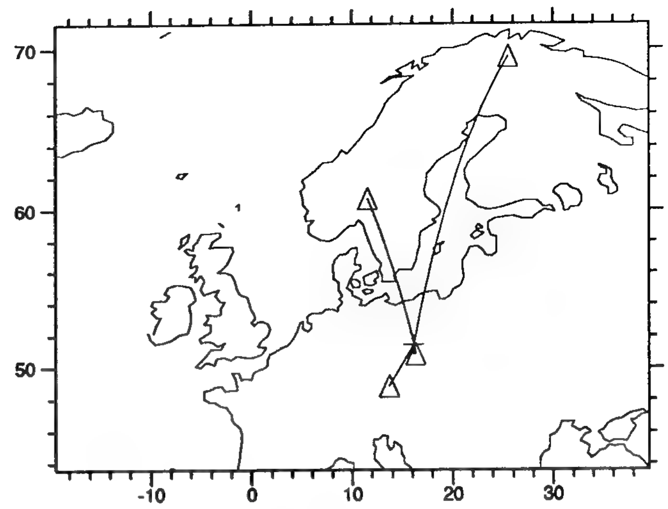
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:34:12.758	23	17.3	92.1	22	0.3	1024
Pg	Pg	11:34:19.283	32	16.6	70.4	26	0.4	1025
Px	Px	11:34:27.100	35	13.6	6.4	7	0.3	1026
Sn	Sn	11:34:52.110	-1	-1.0	-1.0	-1	-1.0	1517
Lg	Lg	11:35:2.085	35	30.2	4.0	49	0.6	1027

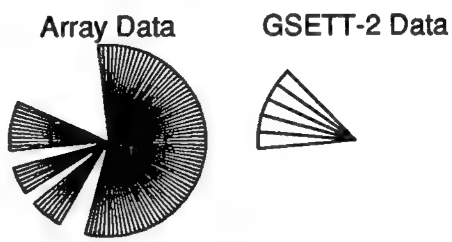
NRA0 9.660 162.67 346.48

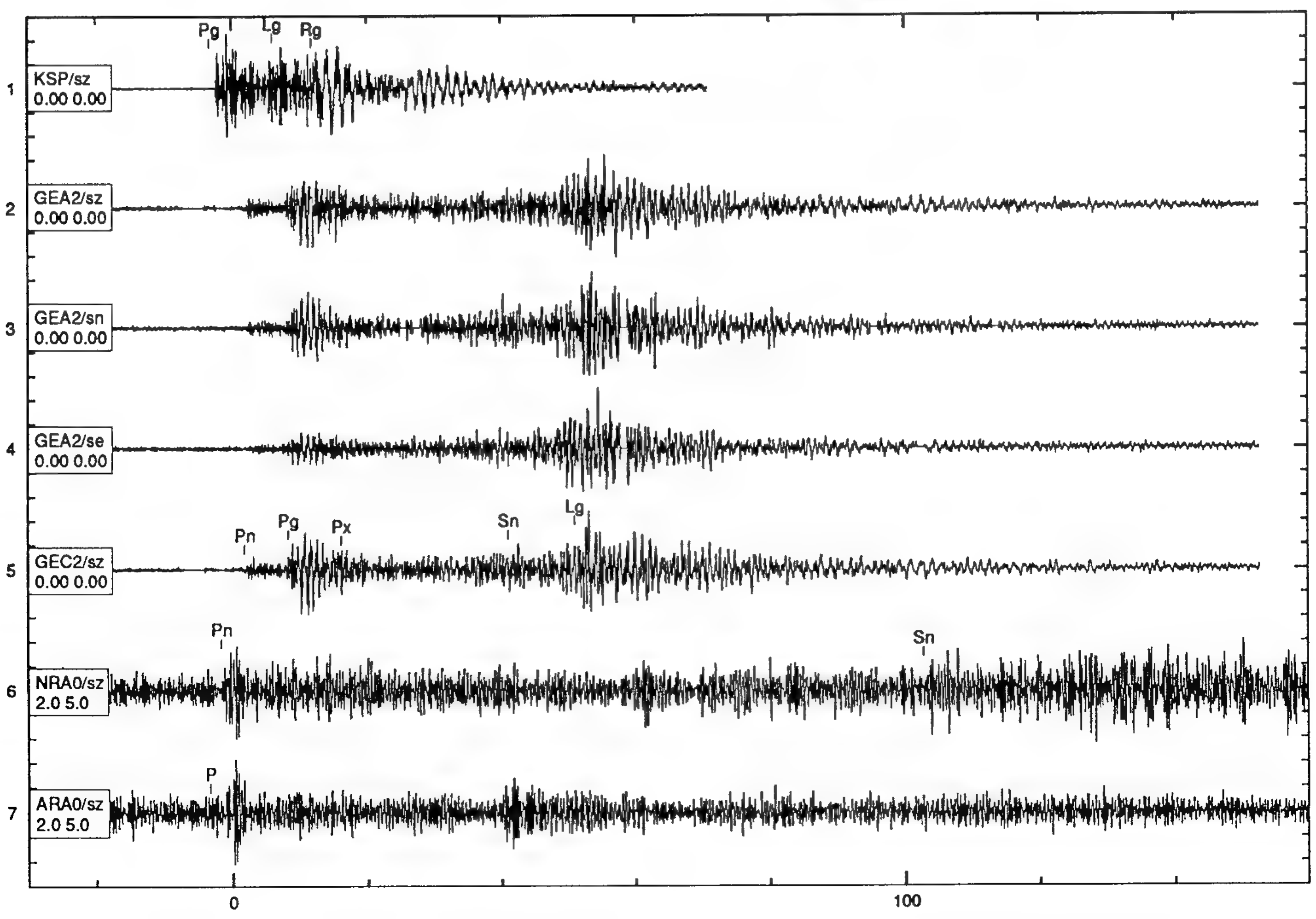
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	11:35:40.261	154	12.7	20.8	1	0.2	1028
Sn	Sn	11:37:24.411	-1	-1.0	-1.0	-1	-1.0	1518

ARA0 18.691 198.57 10.31

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	11:37:37.925	191	12.7	26.1	2	0.3	1030







filtered as noted

Event Number	Dataset Name	Event Type
80	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
49	Rudna (Center); Field Descriptor G-1/5	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 80

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991191	Jul 10,1991	23:57:20.270	51.5340	16.1102	1.0700	-	-	-	-	2.20	qmt	292	WIEJACZ

KSP 0.701 350.61 170.47

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	23:57:33.875	327	11.0	123.3	3142	0.3	1034
Lg	Lg	23:57:43.425	190	9.7	20.4	3256	0.5	1035
Rg	Rg	23:57:51.200	8	15.1	6.0	10531	2.1	1036

GEC2 3.105 28.99 210.83

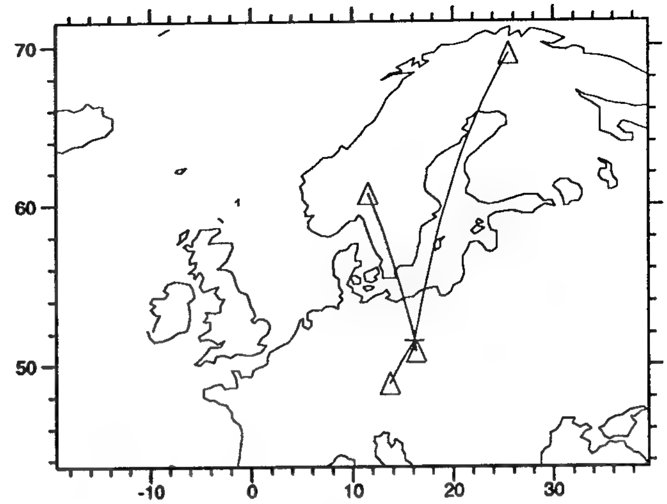
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:58:10.932	33	13.3	35.6	5	0.4	1037
Pg	Pg	23:58:17.857	31	15.6	21.8	6	0.4	1038
Px	Px	23:58:25.800	21	14.2	6.6	2	0.3	1039
Px	Px	23:58:29.100	15	12.3	4.4	2	0.3	1040
Sn	Sx	23:58:49.185	34	24.4	4.7	2	0.3	1041
Lg	Sx	23:58:59.410	40	26.5	3.8	14	0.3	1043
Sx	Lg	23:59:10.423	24	23.4	3.6	22	0.6	1045

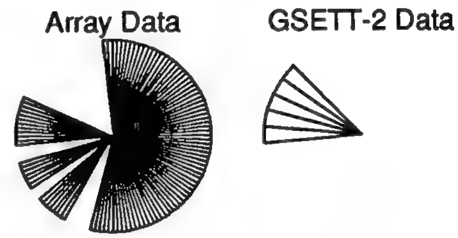
NRAO 9.567 162.58 346.38

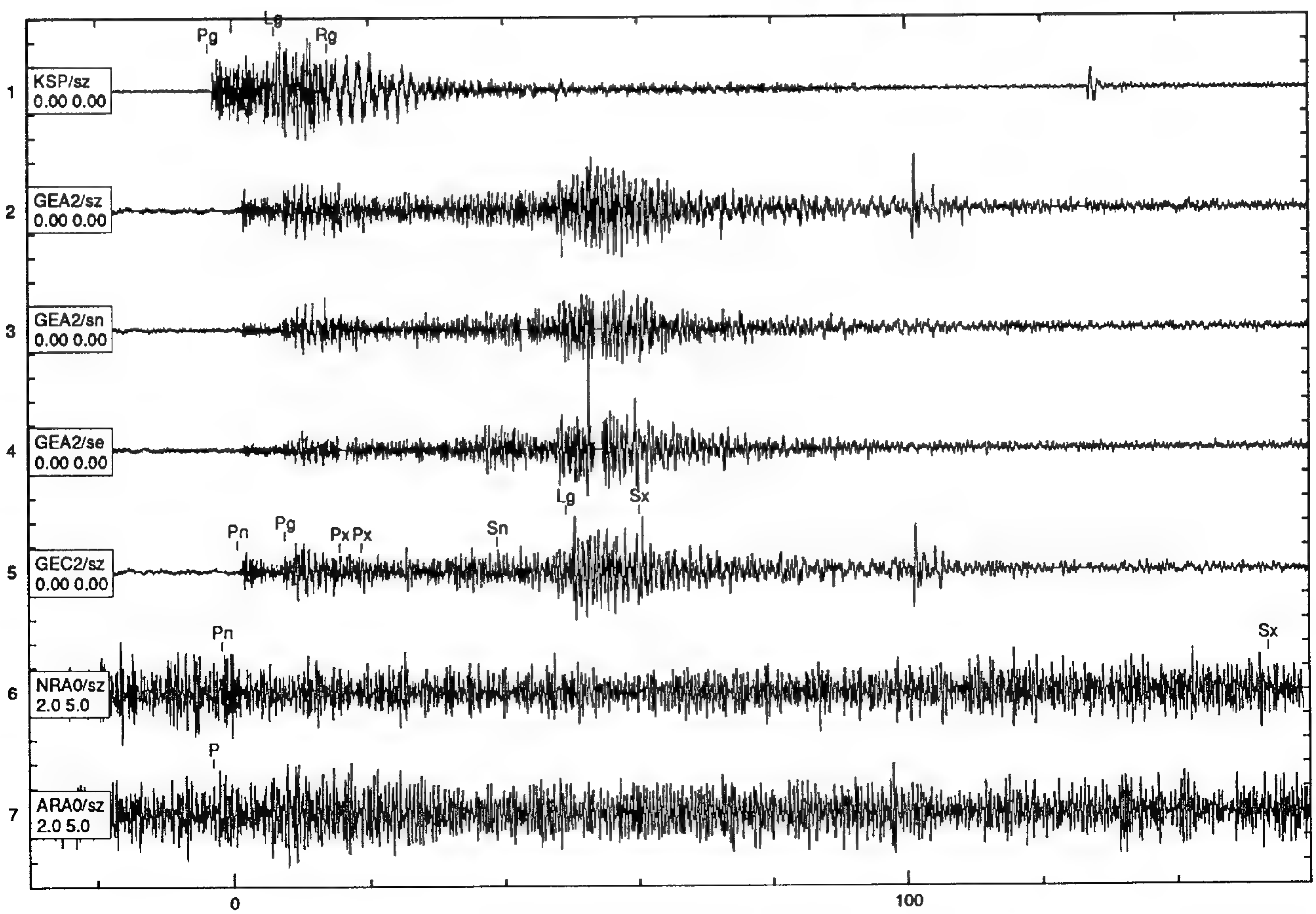
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:59:37.203	166	12.9	9.8	1	0.3	1048
Sx	Sn	0:02:12.460	191	24.6	3.5	1	0.5	1052

ARAO 18.599 198.65 10.37

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	0:01:35.246	189	13.3	5.9	0	0.2	1051







filtered as noted

Event Number	Dataset Name	Event Type
81	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 81

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991202	Jul 21,1991	22:50:41.597	51.4947	16.0762	0.8500	-	-	-	-	1.79	qmt	293	WIEJACZ

KSP 0.666 348.25 168.08

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	22:50:54.392	348	12.8	77.3	1676	0.2	1057
Lg	Lg	22:51:4.092	251	21.4	16.2	1153	0.5	1058
Sx	Sx	22:51:9.150	41	19.2	5.6	1535	0.2	1059
Rg	Rg	22:51:11.275	4	14.6	5.7	1785	1.0	1060

GEC2 3.060 29.02 210.84

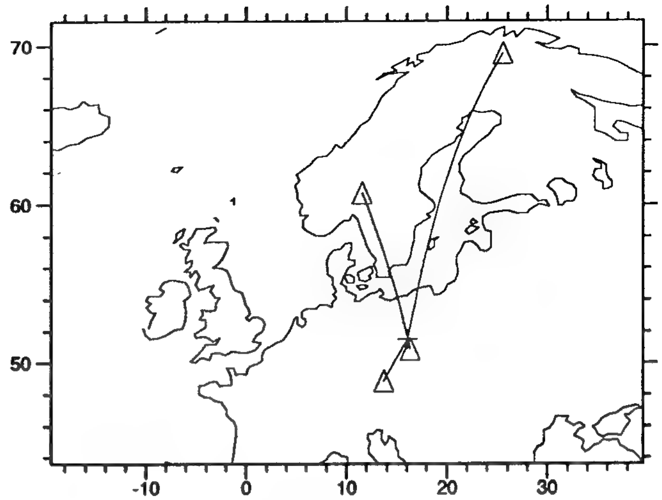
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:51:32.501	-1	-1.0	-1.0	-1	-1.0	1520
Px	Pn	22:51:38.200	30	15.6	28.9	3	0.3	1061
Pg	Px	22:51:38.910	27	15.3	10.7	2	0.4	1062
Lg	Lg	22:52:22.201	31	29.0	3.8	4	0.6	1063

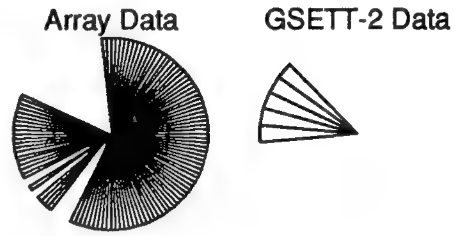
NRA0 9.600 162.76 346.53

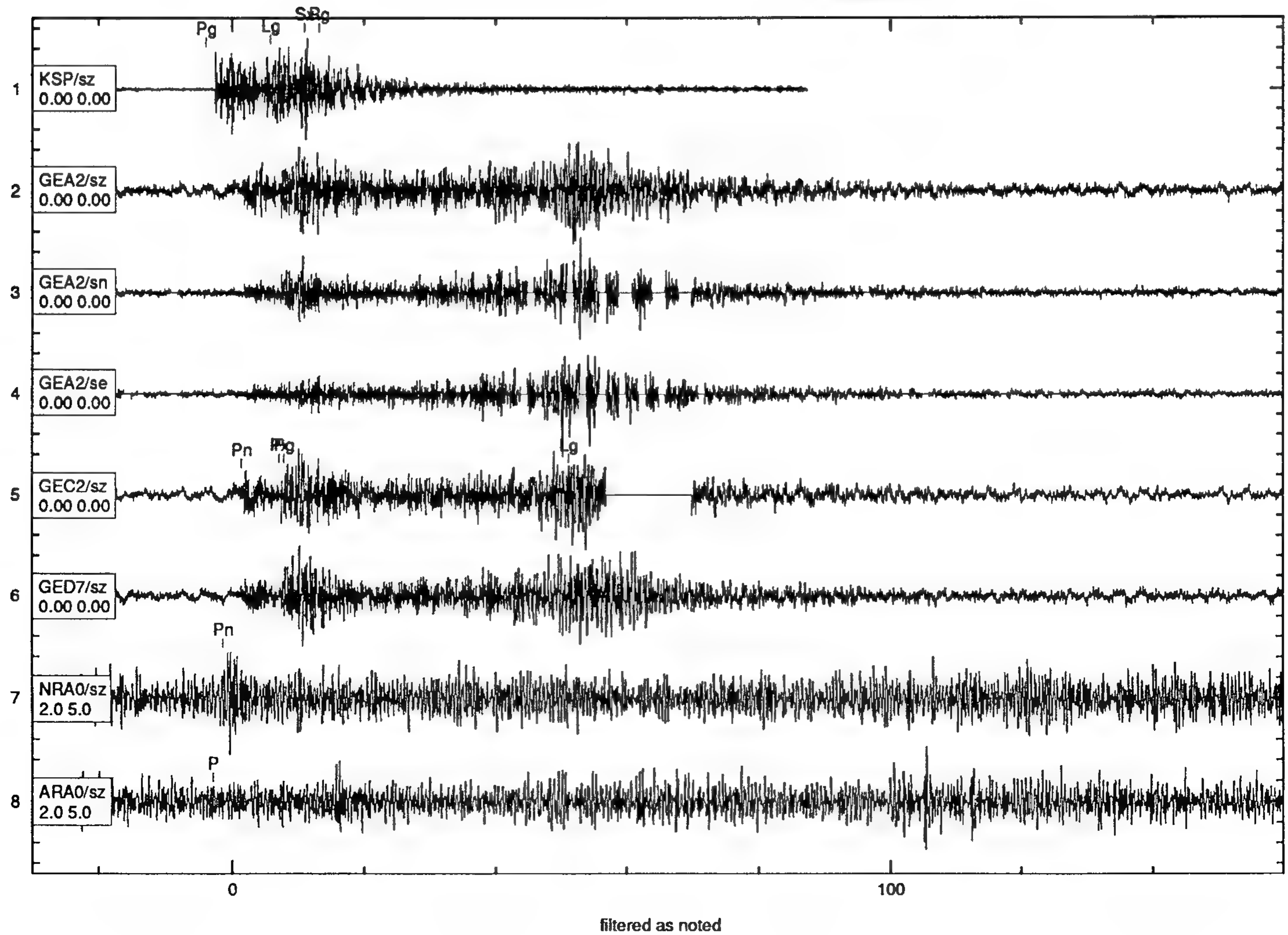
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:52:59.281	152	12.4	19.8	0	0.2	1064

ARA0 18.642 198.69 10.39

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	P	22:54:57.306	-1	-1.0	-1.0	-1	-1.0	1519







Event Number	Dataset Name	Event Type
82	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 82

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991205	Jul 24,1991	3:17:46.151	51.5581	16.0753	0.9700	-	-	-	-	2.66	qmt	294	WIEJACZ

KSP 0.729 349.24 169.07

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	3:17:58.851	342	12.9	258.2	4509	0.2	1066
Lg	Lg	3:18:9.351	63	20.8	14.1	4897	0.3	1067
Rg	Rg	3:18:17.551	333	9.3	3.2	2122	0.2	1068
Sx	Rg	3:18:21.700	2	19.7	4.5	5147	1.2	1069

GEC2 3.115 28.41 210.23

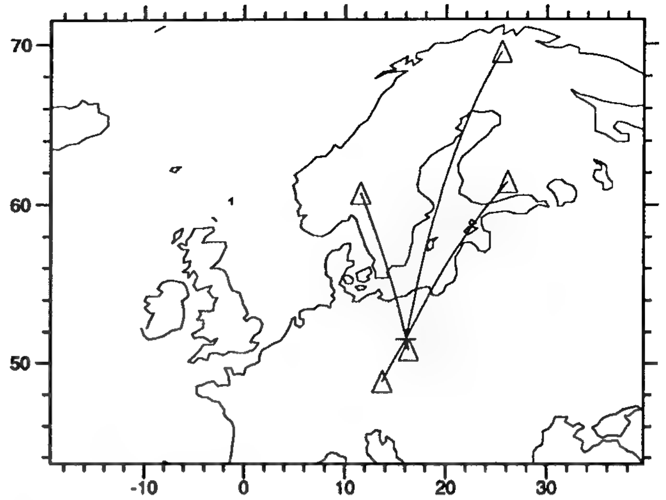
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:18:36.693	22	13.7	29.9	1	0.1	1070
Pg	Pg	3:18:43.243	29	16.0	21.1	3	0.2	1071
Px	Px	3:18:50.075	17	15.2	8.9	2	0.3	1072
Lg	Sx	3:19:24.523	24	31.6	7.2	23	0.6	1073
Sx	Lg	3:19:36.524	44	25.1	4.3	8	0.5	1075

NRA0 9.538 162.67 346.44

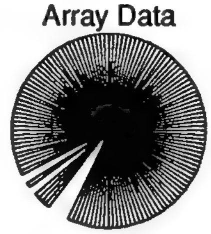
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:20:2.225	157	12.3	18.2	0	0.2	1077
Sn	Lg	3:21:47.387	167	24.7	3.0	1	0.2	1088

FIA0 11.329 213.50 25.14

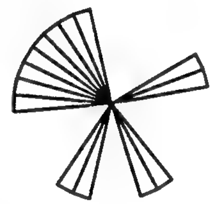
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:20:27.081	215	11.1	15.4	1	0.2	1082
Sn	Sn	3:22:29.356	-1	-1.0	-1.0	-1	-1.0	1521

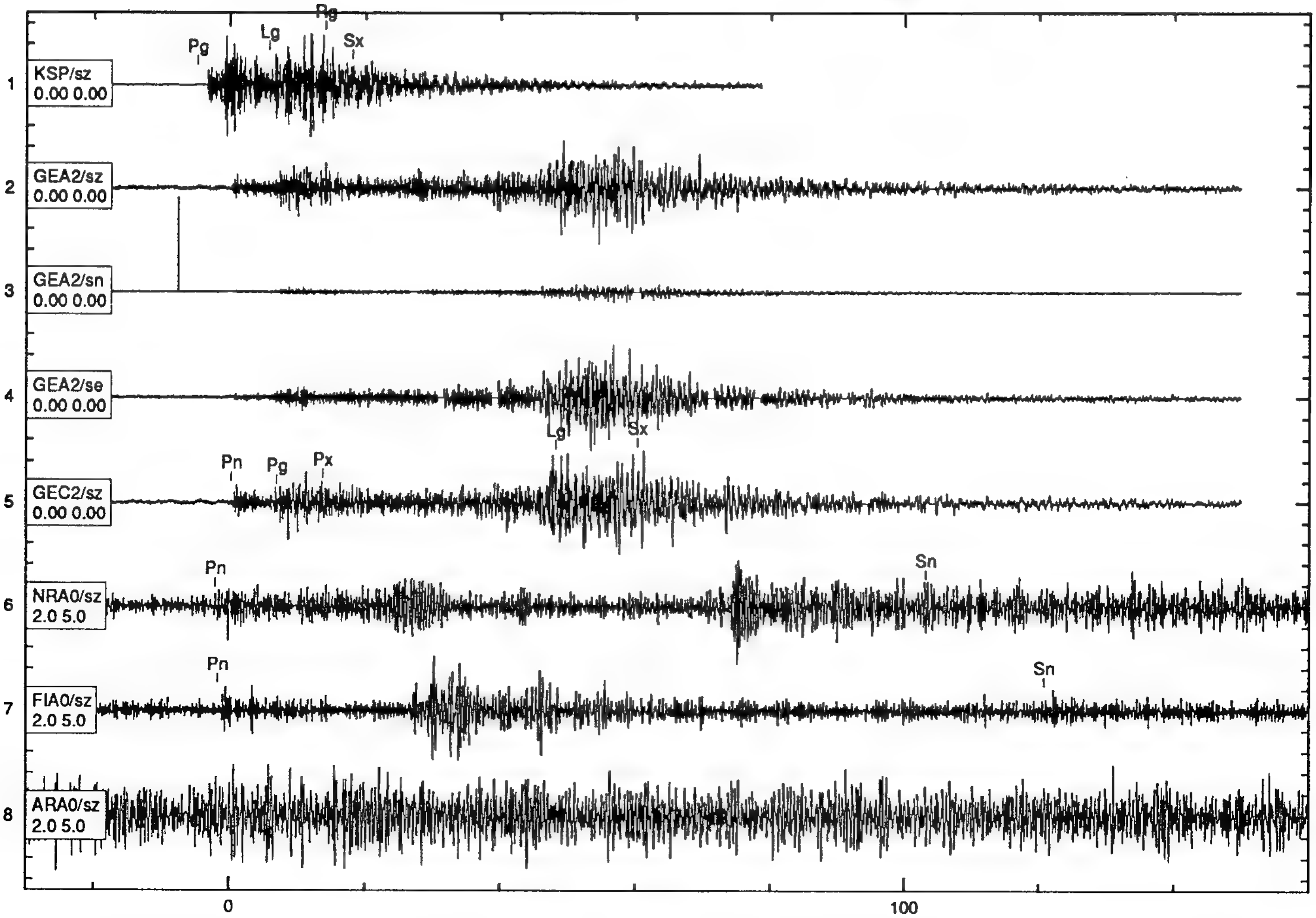


Array Data



GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
83	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 83

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991209	Jul 28,1991	23:32:43.364	51.4947	16.0762	0.8500	-	-	-	-	2.34	qmt	295	WIEJACZ

KSP 0.666 348.25 168.08

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	23:32:56.374	340	15.2	41.2	1216	0.4	1109
Lg	Lg	23:33:5.374	66	18.8	16.4	1031	0.5	1110
Rg	Rg	23:33:12.625	6	12.4	7.2	2882	1.3	1111
Px	Pn	23:33:17.825	13	15.7	5.3	3326	1.4	1112

GEC2 3.060 29.02 210.84

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:33:33.928	-1	-1.0	-1.0	-1	-1.0	1522
Pg	Pn	23:33:40.228	35	17.0	24.1	3	0.3	1114
Lg	Lg	23:34:21.798	33	30.8	4.4	5	0.6	1115

NRAO 9.600 162.76 346.53

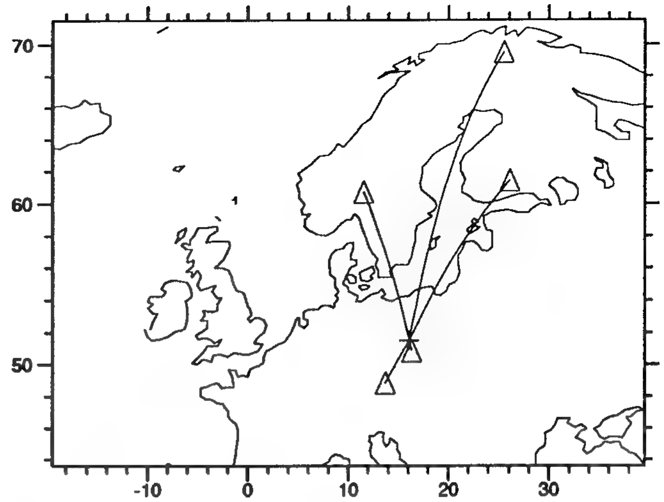
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:35:0.089	153	12.1	17.7	0	0.2	1117

FIAO 11.386 213.36 25.01

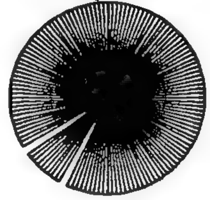
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:35:24.636	217	10.7	10.4	0	0.2	1118

ARAO 18.642 198.69 10.39

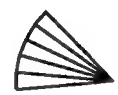
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	P	23:36:59.320	197	9.5	5.4	0	0.3	1119

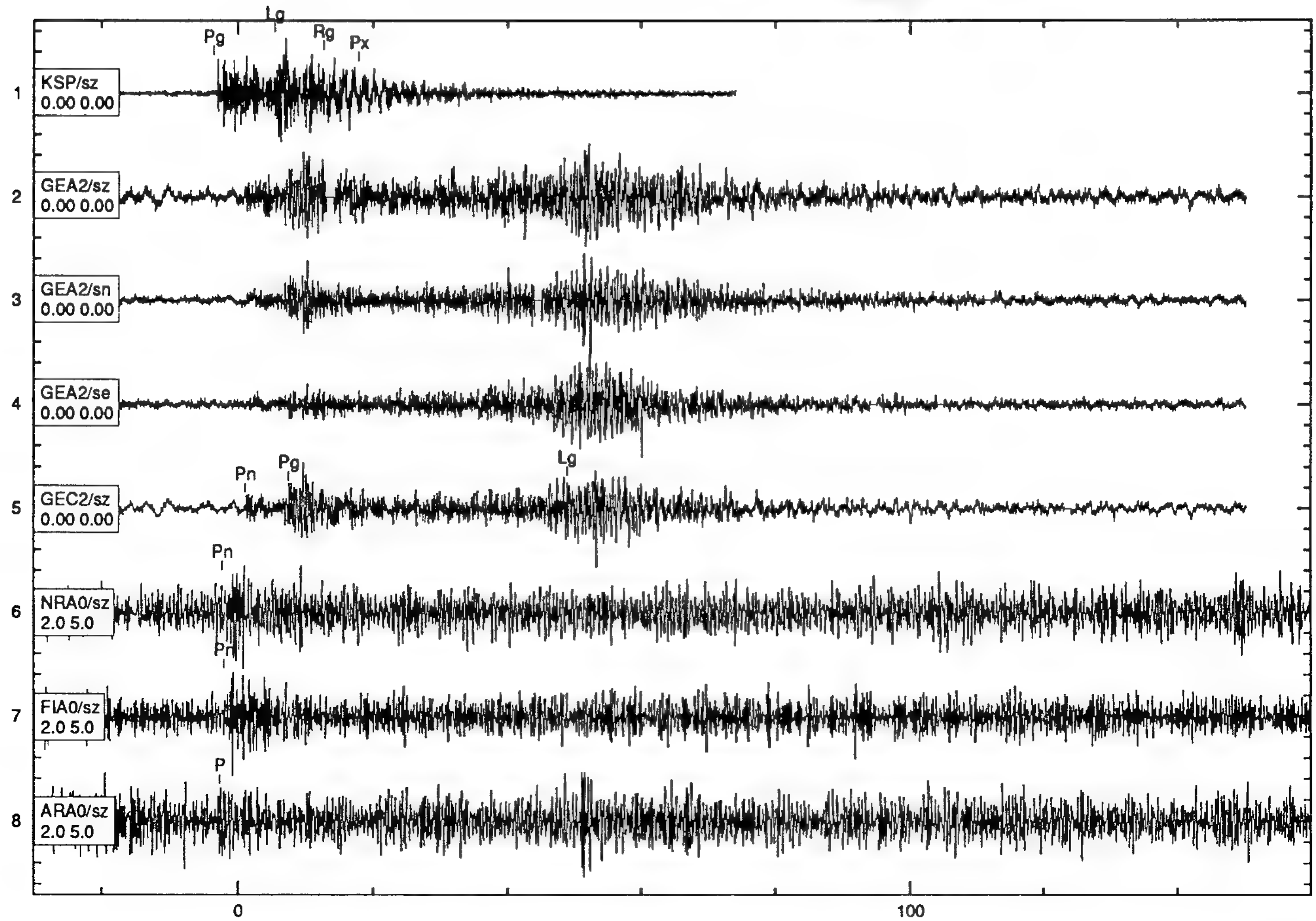


Array Data



GSETT-2 Data





filtered as noted

Event Number	Dataset Name	Event Type
84	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
48	Polkowice (West); Field Descriptor G-31	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 84

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991235	Aug 23,1991	12:11:23.567	51.5120	16.0591	0.8300	-	-	-	-	2.65	qmt	296	WIEJACZ

KSP 0.686 347.67 167.49

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	12:11:37.113	340	11.9	92.3	3526	0.2	1141
Lg	Lg	12:11:46.313	174	6.0	13.6	2143	0.8	1142
Rg	Rg	12:11:55.513	5	15.5	4.4	3350	1.0	1144

GEC2 3.070 28.69 210.49

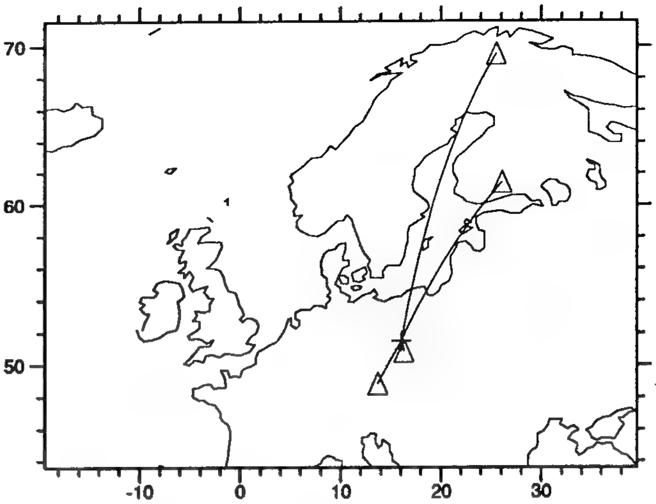
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:12:14.241	-1	-1.0	-1.0	-1	-1.0	1524
Pg	Pn	12:12:20.716	26	15.5	15.1	3	0.3	1146
Px	Pg	12:12:27.100	29	15.9	7.3	3	0.3	1147
Sn	Sn	12:12:51.618	-1	-1.0	-1.0	-1	-1.0	1523
Lg	Sx	12:13:5.593	26	24.0	8.6	6	0.6	1148
Sx	Lg	12:13:11.099	36	25.6	5.1	8	0.5	1149

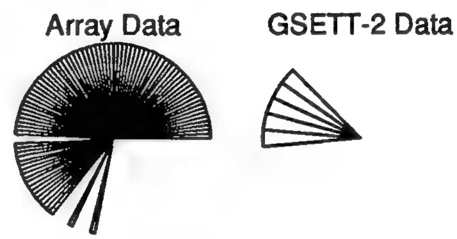
FIA0 11.375 213.45 25.08

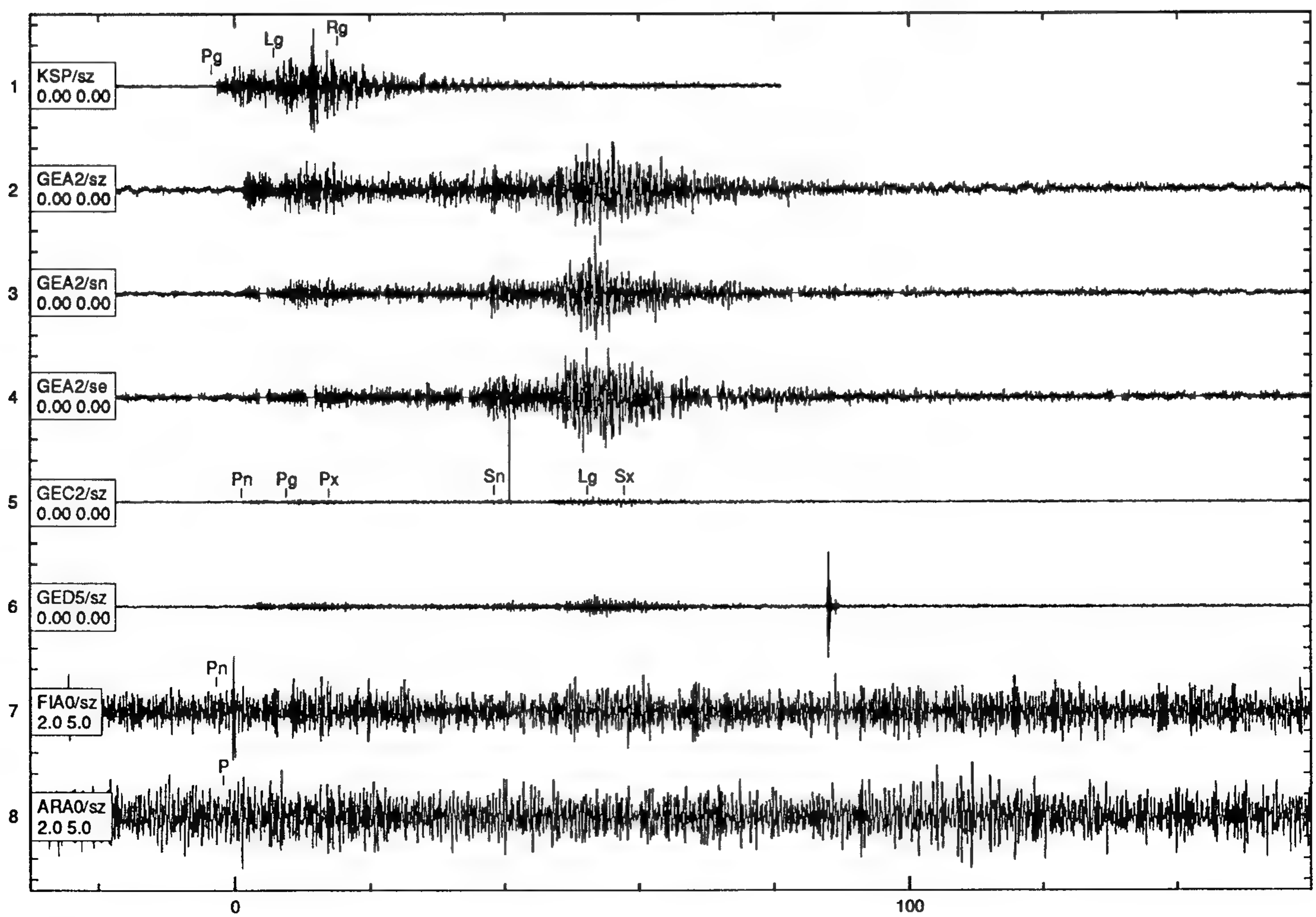
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	12:14:4.191	216	11.3	5.1	1	0.3	1150

ARA0 18.627 198.73 10.41

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	12:15:40.295	186	12.6	5.0	0	0.4	1153







filtered as noted

Event Number	Dataset Name	Event Type
85	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
43	Polkowice (Center); Field Descriptor G-14	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 85

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991271	Sep 28,1991	0:37:51.024	51.4775	16.0924	0.7900	-	-	-	-	2.53	qmt	297	WIEJACZ

KSP 0.648 348.81 168.65

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pn	0:38:3.828	349	12.1	243.2	3640	0.2	1194
Lg	Lg	0:38:13.228	225	17.2	19.3	2928	0.3	1195
Rg	Px	0:38:20.128	5	12.2	7.9	3319	0.8	1196
Sx	Px	0:38:24.275	16	12.1	5.5	3420	0.9	1197

GEC2 3.051 29.35 211.18

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:38:41.209	-1	-1.0	-1.0	-1	-1.0	1527
Px	Pn	0:38:45.325	28	12.9	41.7	2	0.3	1198
Pg	Px	0:38:48.038	33	16.1	16.9	1	0.3	1199
Px	Px	0:38:54.925	1	18.0	4.5	1	0.3	1200
Sn	Sn	0:39:19.813	-1	-1.0	-1.0	-1	-1.0	1525
Lg	Sx	0:39:28.963	29	29.1	9.0	8	0.4	1201
Sx	Lg	0:39:35.123	36	26.6	4.1	9	0.6	1202

NRAO 9.619 162.72 346.51

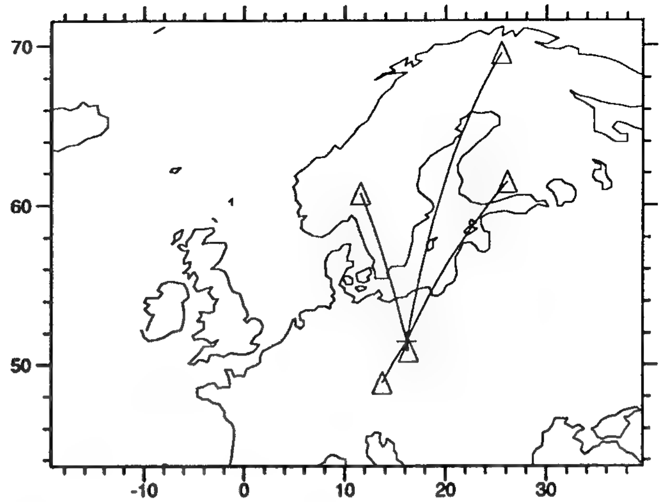
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:40:7.804	151	12.1	15.9	1	0.2	1206
Sn	Sn	0:41:52.432	-1	-1.0	-1.0	-1	-1.0	1526

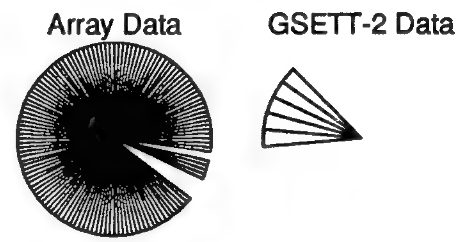
FIA0 11.397 213.28 24.94

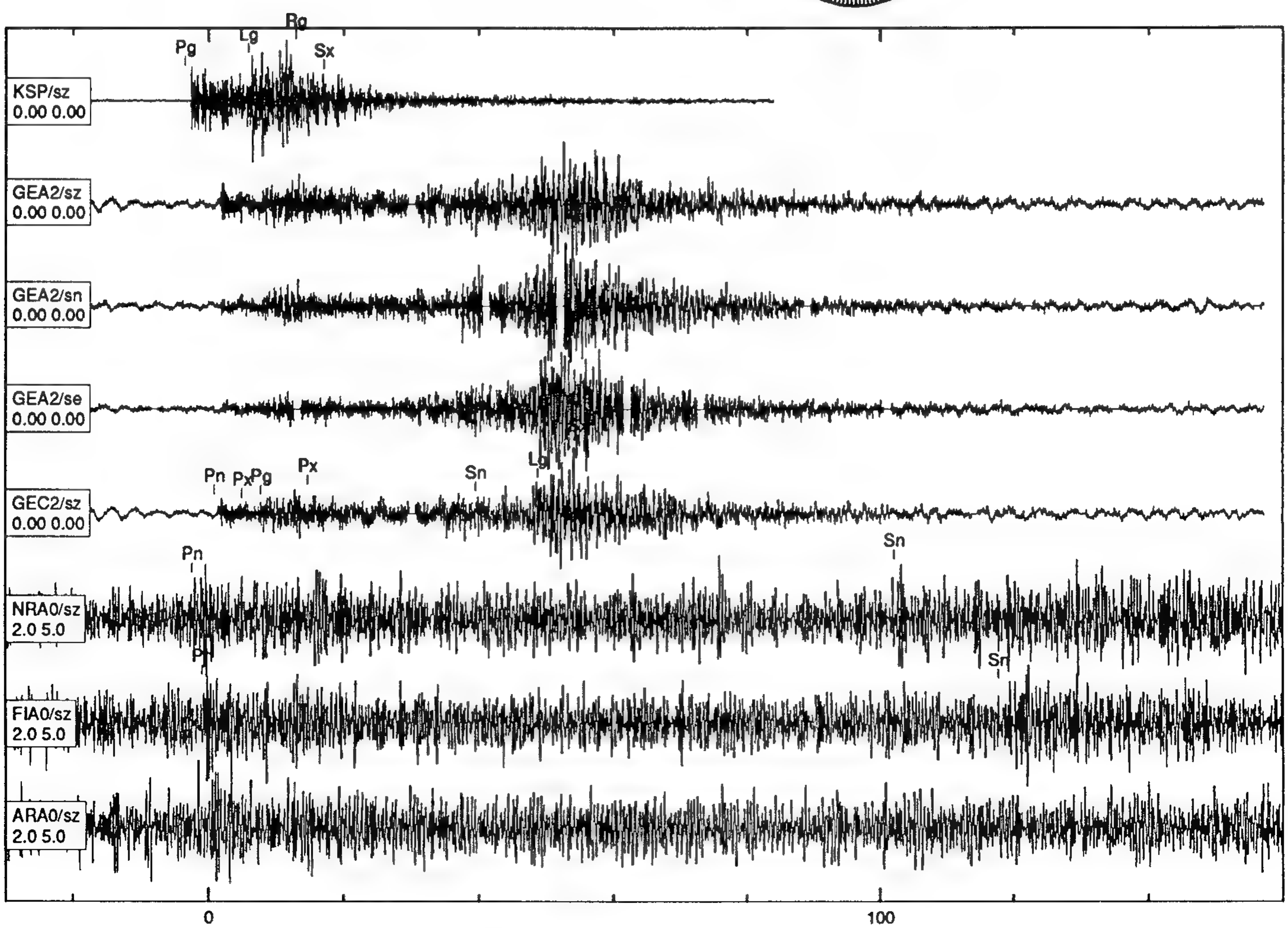
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	0:40:33.513	219	11.6	7.0	1	0.2	1207
Sn	Sn	0:42:32.108	208	20.8	6.4	1	0.3	1209

ARA0 18.657 198.65 10.36

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	0:42:6.528	201	11.5	9.1	1	0.4	1208







filtered as noted

Event Number	Dataset Name	Event Type
86	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
53	Rudna (West); Field Descriptor G-11/6	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 86

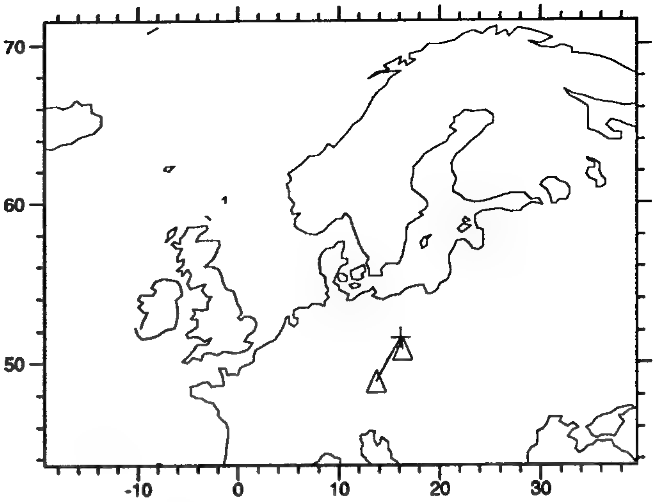
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991295	Oct 22,1991	19:19:24.689	51.5605	16.1150	1.1500	-	-	-	-	3.27	qmt	280	WIEJACZ

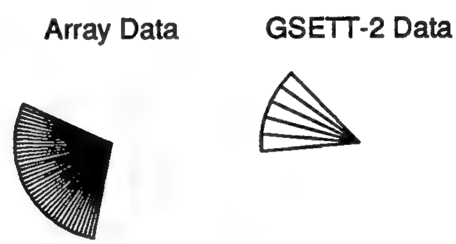
KSP 0.727 351.19 171.05

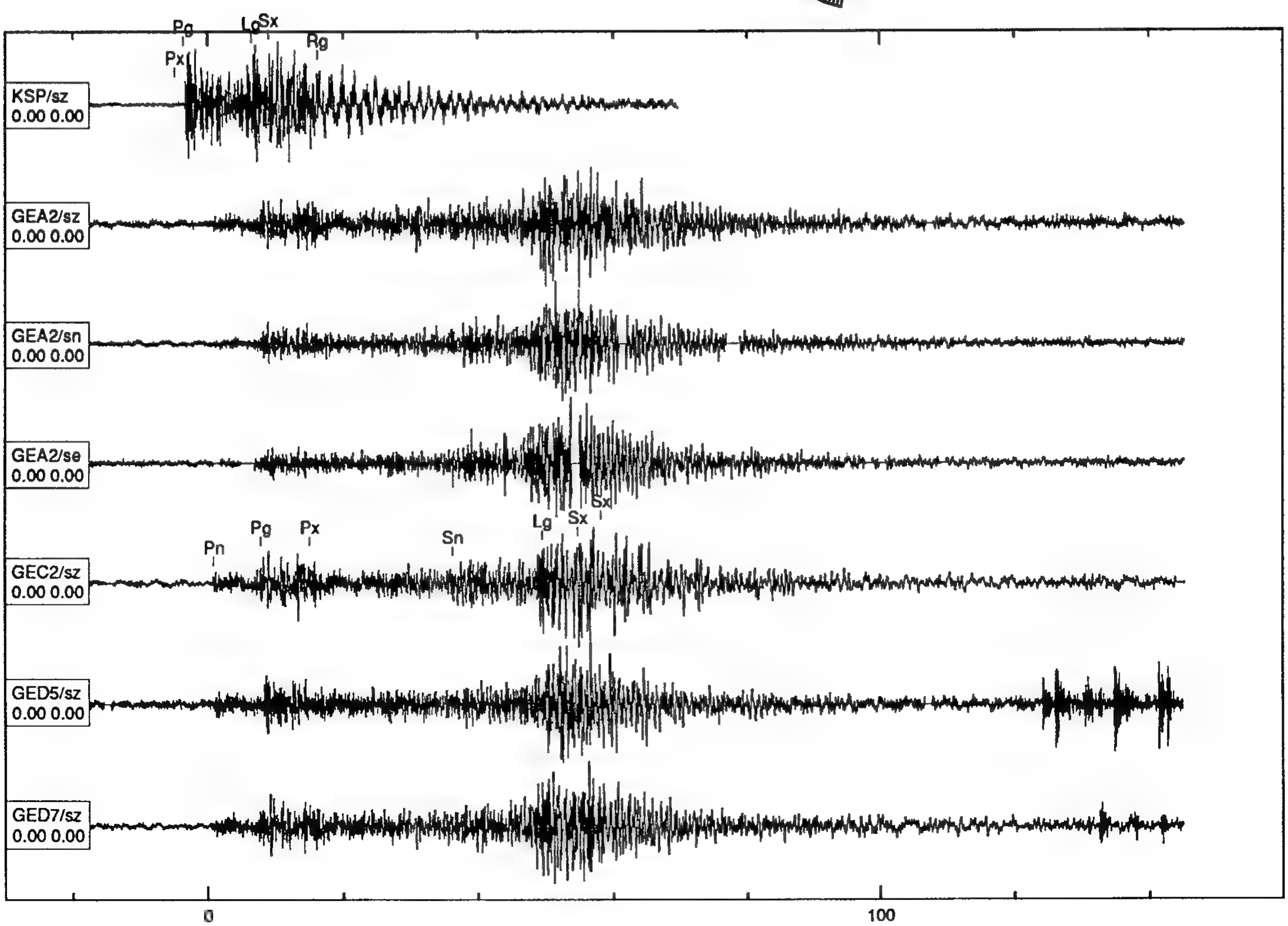
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Px	Px	19:19:37.157	-1	-1.0	-1.0	-1	-1.0	1502
Pg	Pg	19:19:38.457	349	12.2	104.6	2560	0.2	1211
Lg	Lg	19:19:48.457	-1	-1.0	11.5	2385	0.6	1212
Sx	Px	19:19:50.850	228	15.1	10.9	3398	0.6	1320
Rg	Px	19:19:58.232	16	9.6	3.6	3559	1.1	1213

GEC2 3.129 28.78 210.63

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	19:20:15.915	61	12.6	33.2	2	0.3	1214
Pg	Pn	19:20:22.840	27	16.5	18.8	1	0.3	1215
Px	Px	19:20:30.000	358	17.0	10.8	3	0.3	1321
Sn	Sn	19:20:51.340	-1	-1.0	-1.0	-1	-1.0	1504
Lg	Sx	19:21:4.440	34	27.7	7.2	10	0.4	1216
Sx	Sx	19:21:9.800	15	26.2	6.2	6	0.3	1217
Sx	Sx	19:21:13.123	23	21.4	3.8	20	0.6	1218







filtered as noted

Event Number	Dataset Name	Event Type
87	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
43	Polkowice (Center); Field Descriptor G-14	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 87

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991305	Nov 1,1991	5:49:1.370	51.4775	16.0924	0.7900	-	-	-	-	2.48	qmt	299	WIEJACZ

KSP 0.648 348.81 168.65

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	5:49:13.258	350	12.0	234.7	3785	0.2	1219
Lg	Lg	5:49:23.358	-1	-1.0	16.9	3493	0.6	1220
Rg	Rg	5:49:30.258	89	16.8	5.8	2313	0.7	1322

GEC2 3.051 29.35 211.18

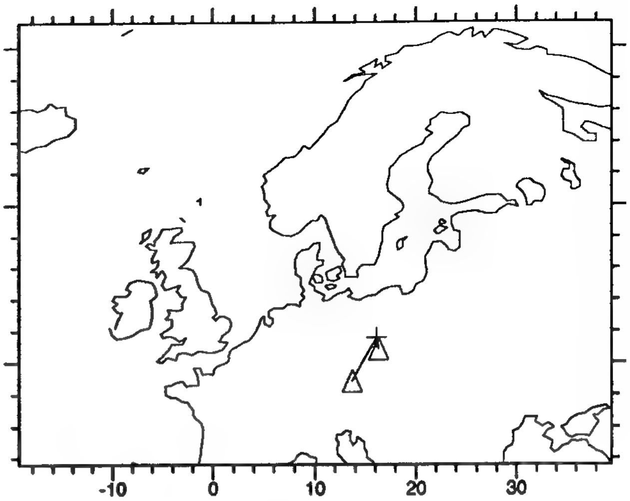
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	5:49:51.983	24	12.2	39.0	2	0.3	1221
Pg	Px	5:49:58.133	25	12.6	23.4	4	0.5	1222
Px	Px	5:50:7.800	35	16.6	6.4	1	0.3	1223
Sn	Sn	5:50:28.708	-1	-1.0	-1.0	-1	-1.0	1555
Lg	Sx	5:50:40.114	23	26.3	8.4	10	0.4	1224
Sx	Sx	5:50:46.824	35	25.1	4.9	8	0.5	1225

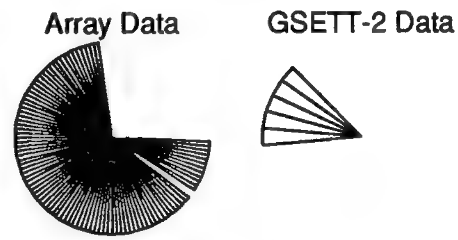
NRAO 9.619 162.72 346.51

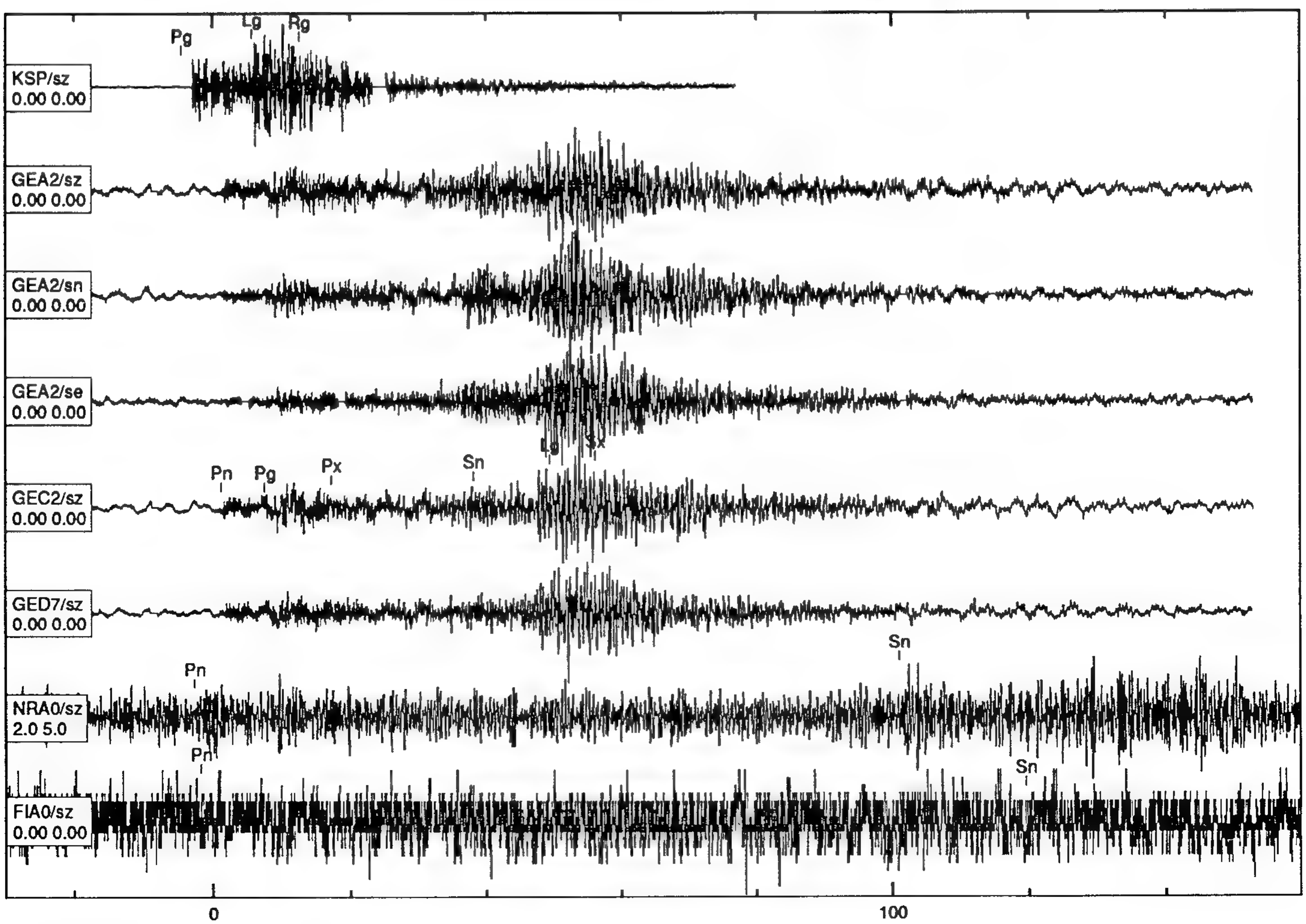
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	5:51:18.064	153	12.1	9.3	1	0.2	1226
Sn	Sn	5:53:1.714	162	23.1	2.5	1	0.2	1228

FIAO 11.397 213.28 24.94

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	5:51:43.263	206	12.1	7.4	1	0.2	1227
Sn	Sn	5:53:44.313	212	20.1	6.9	1	0.3	1229







filtered as noted

Event Number	Dataset Name	Event Type
88	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
49	Rudna (Center); Field Descriptor G-1/5	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 88

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991316	Nov 12,1991	20:57:8.428	51.5351	16.1077	1.0700	-	-	-	-	2.56	qmt	306	WIEJACZ

KSP 0.703 350.50 170.36

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	20:57:21.707	323	10.9	99.0	2800	0.3	1230
Sx	Rg	20:57:28.075	-1	-1.0	17.6	1705	0.7	1231
Lg	Sx	20:57:31.487	-1	-1.0	6.8	1849	0.5	1232
Rg	Rg	20:57:40.082	10	13.7	5.0	4805	1.4	1233

GEC2 3.105 28.95 210.79

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	20:57:59.318	33	12.6	26.4	4	0.4	1234
Pg	Pg	20:58:5.967	32	15.9	17.9	2	0.3	1235
Px	Px	20:58:13.600	22	15.1	7.6	3	0.3	1236
Px	Px	20:58:17.300	9	14.8	4.2	1	0.3	1237
Sn	Sn	20:58:37.718	-1	-1.0	-1.0	-1	-1.0	1569
Lg	Lg	20:58:47.493	28	26.1	5.6	10	0.5	1238

NRAO 9.565 162.59 346.38

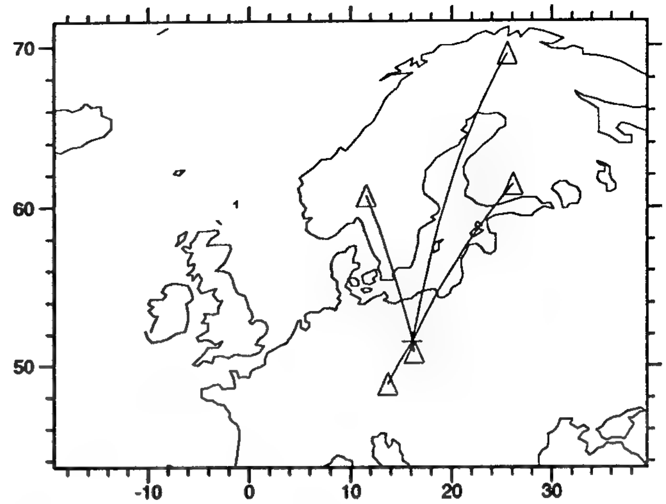
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	20:59:24.511	157	12.1	8.0	0	0.3	1239

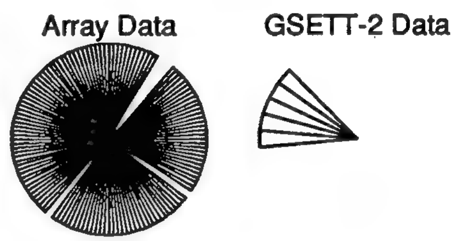
FIAO 11.341 213.36 25.03

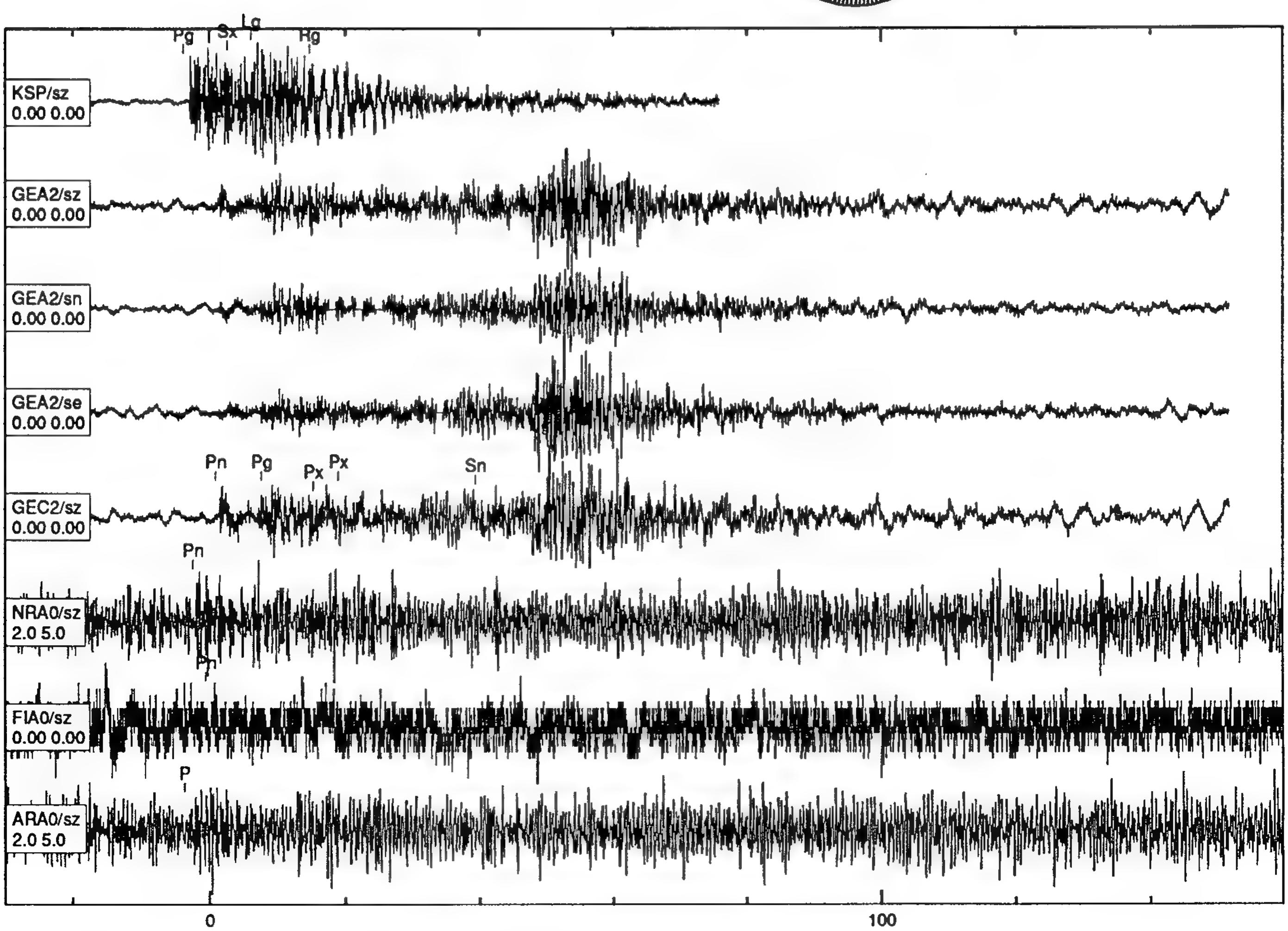
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	20:59:50.450	218	10.2	8.8	1	0.3	1240

ARAO 18.598 198.65 10.37

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	21:01:22.701	191	13.4	9.0	0	0.3	1241







filtered as noted

Event Number	Dataset Name	Event Type
89	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

noteid	Notes	refid
50	Rudna (Center); Field Descriptor G-4/3	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 89

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991320	Nov 16,1991	22:22:37.149	51.5185	16.0891	0.9400	-	-	-	-	2.47	qmt	309	WIEJACZ

KSP 0.688 349.31 169.16

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	22:22:49.972	350	11.6	239.9	3980	0.2	1242
Lg	Rg	22:22:59.772	-1	-1.0	17.1	2495	0.7	1243
Rg	Sx	22:23:8.372	-1	-1.0	8.4	5826	0.5	1244

GEC2 3.085 28.92 210.75

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:23:28.010	29	12.0	64.2	4	0.3	1245
Pg	Pg	22:23:34.335	30	16.6	17.4	1	0.3	1246
Px	Pn	22:23:41.325	38	15.1	4.6	1	0.2	1329
Px	Pn	22:23:52.225	29	15.9	4.7	6	0.5	1247
Sn	Sx	22:24:5.425	19	21.9	4.6	2	0.3	1248
Sx	Sx	22:24:12.824	39	30.1	19.1	33	0.5	1249
Lg	Lg	22:24:18.060	-1	-1.0	-1.0	-1	-1.0	1570
Sx	Lg	22:24:22.125	31	27.2	5.8	12	0.5	1310

NRAO 9.579 162.68 346.46

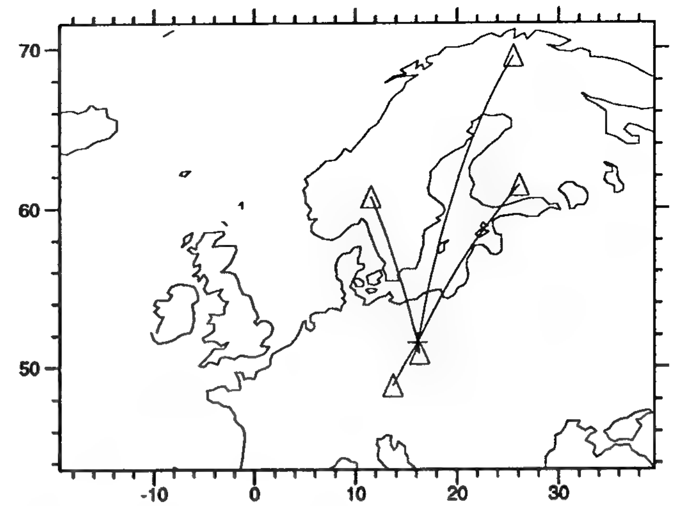
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:24:53.391	167	13.1	14.8	1	0.2	1250
Sn	Sn	22:26:36.966	169	24.5	3.4	1	0.2	1253

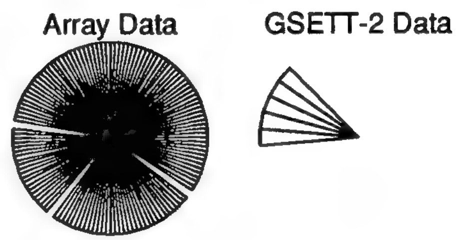
FIA0 11.361 213.38 25.03

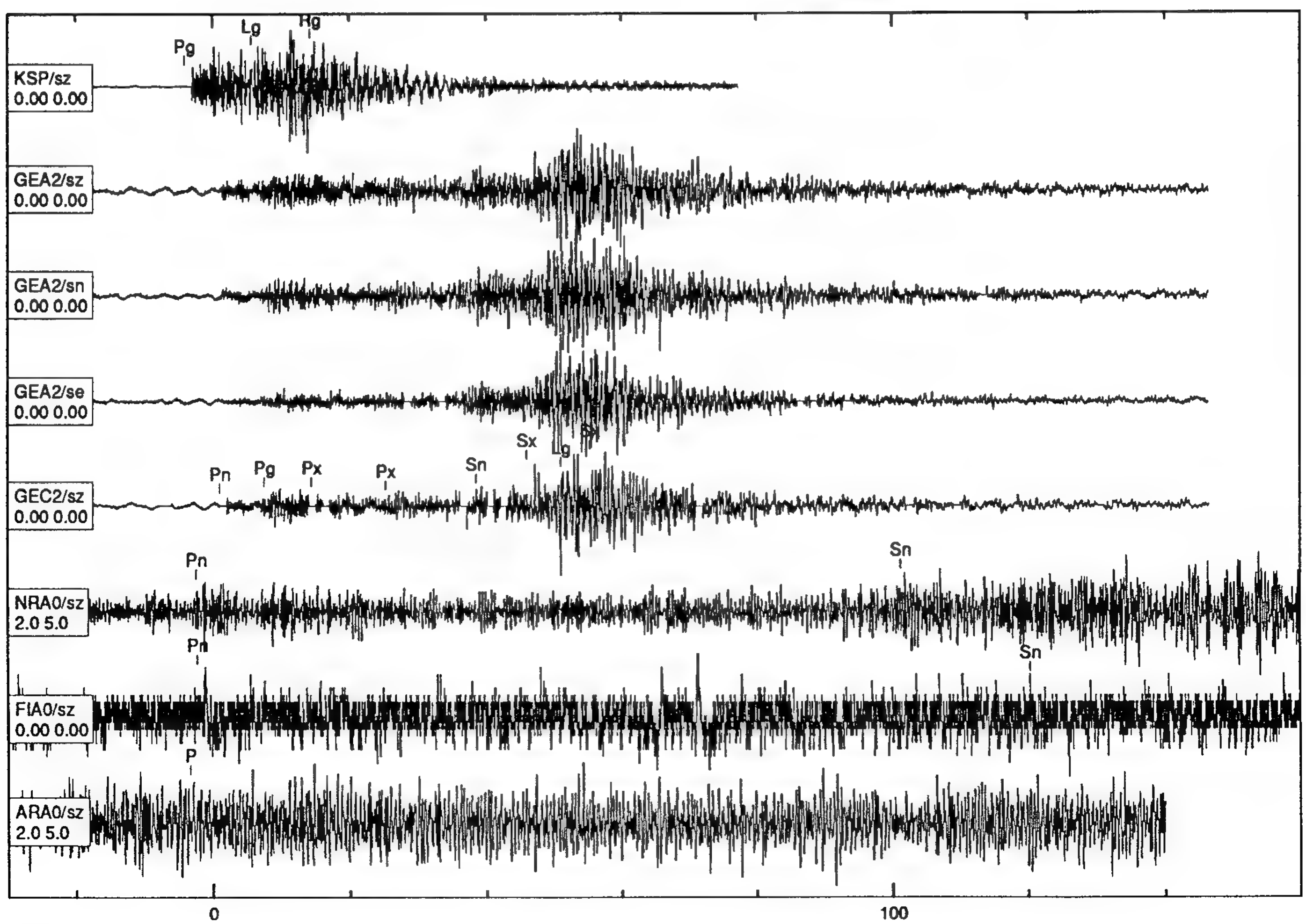
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	22:25:17.914	226	10.9	13.9	1	0.2	1252
Sn	Sn	22:27:20.314	208	16.5	3.9	2	0.5	1255

ARA0 18.617 198.68 10.38

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	22:26:52.114	189	12.6	6.5	0	0.2	1254







filtered as noted

Event Number	Dataset Name	Event Type
90	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Sieroszowice	505

noteid	Notes	refid
55	Sieroszowice (East); Field Descriptor G-21S	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 90

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991324	Nov 20,1991	15:41:3.979	51.5581	16.0753	0.9700	-	-	-	-	2.47	qmt	308	WIEJACZ

KSP 0.729 349.24 169.07

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	15:41:16.797	350	13.7	242.8	7930	0.3	1256
Lg	Lg	15:41:27.125	-1	-1.0	16.5	4463	0.6	1257
Sx	Sx	15:41:31.600	-1	-1.0	16.0	10861	0.3	1258
Rg	Rg	15:41:35.997	103	12.7	2.8	5645	0.5	1336
Sx	Sx	15:41:39.100	52	1.8	5.3	13165	1.2	1337

GEC2 3.115 28.41 210.23

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	15:41:54.075	29	12.2	58.2	4	0.3	1259
Pg	Pg	15:42:1.000	33	15.8	28.0	3	0.3	1260
Px	Px	15:42:7.450	35	17.2	10.3	3	0.5	1261
Px	Pn	15:42:18.675	28	16.4	4.1	2	0.3	1338
Lg	Sx	15:42:42.100	32	27.5	8.6	7	0.3	1262
Sx	Lg	15:42:49.400	39	27.7	4.2	14	0.4	1263
Sx	Sx	15:42:56.824	48	25.1	4.0	12	0.5	1264

NRAO 9.538 162.67 346.44

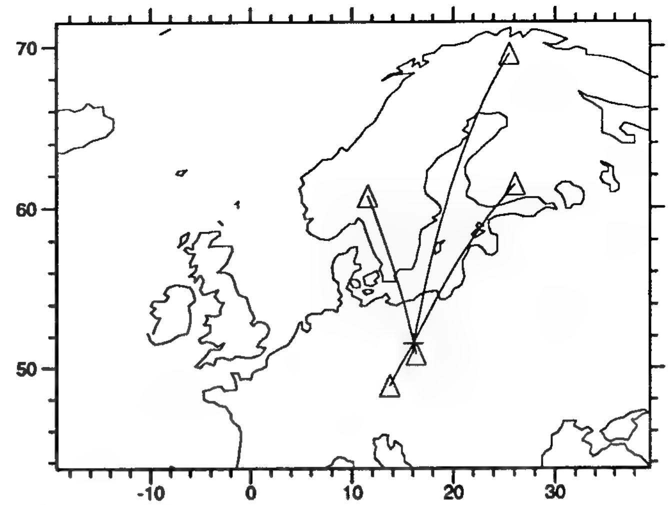
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	15:43:19.496	154	12.3	8.4	0	0.2	1265
Sn	Sn	15:45:1.471	169	24.9	2.7	1	0.2	1267

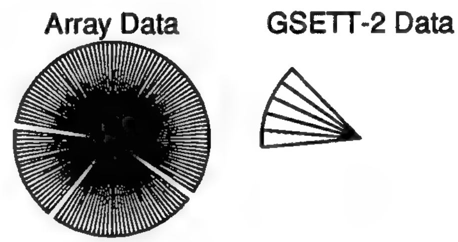
FIAO 11.329 213.50 25.14

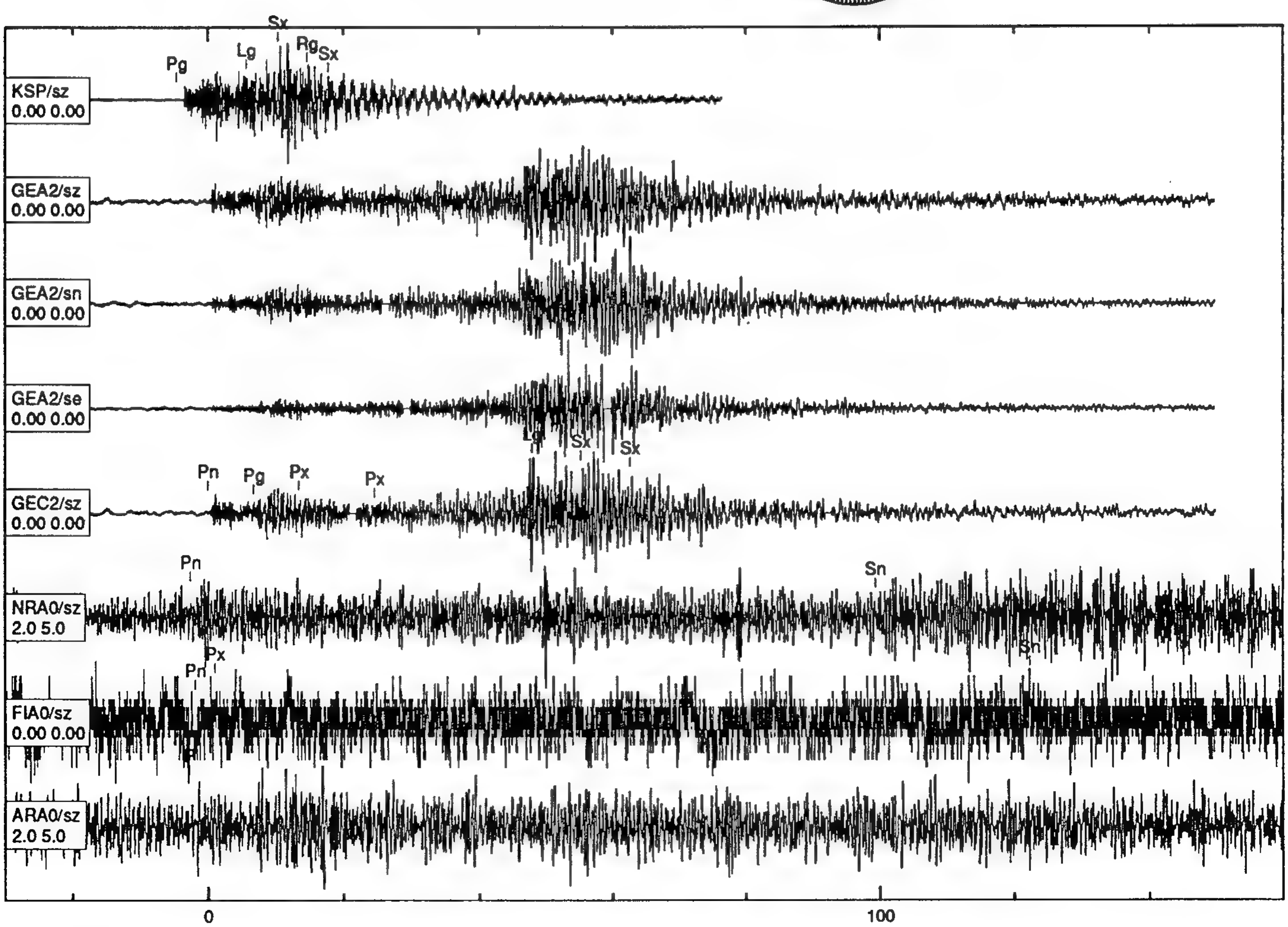
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	15:43:44.650	221	11.5	16.0	1	0.2	1266
Px	Px	15:43:47.600	204	11.0	7.6	0	0.2	1315
Sn	Sn	15:45:48.675	-1	-1.0	-1.0	-1	-1.0	1571

ARAO 18.579 198.73 10.42

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	15:45:18.928	197	12.5	5.8	0	0.3	1268







filtered as noted

Event Number	Dataset Name	Event Type
91	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Sieroszowice	505

noteid	Notes	refid
55	Sieroszowice (East); Field Descriptor G-21S	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 91

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991333	Nov 29,1991	17:47:1.388	51.5581	16.0753	0.9700	-	-	-	-	2.51	qmt	310	WIEJACZ

KSP 0.729 349.24 169.07

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	17:47:15.423	335	12.6	233.3	5832	0.2	1271
Lg	Lg	17:47:25.323	-1	-1.0	10.1	1121	0.1	1272
Rg	Rg	17:47:33.123	42	21.1	4.2	3653	0.4	1344

GEC2 3.115 28.41 210.23

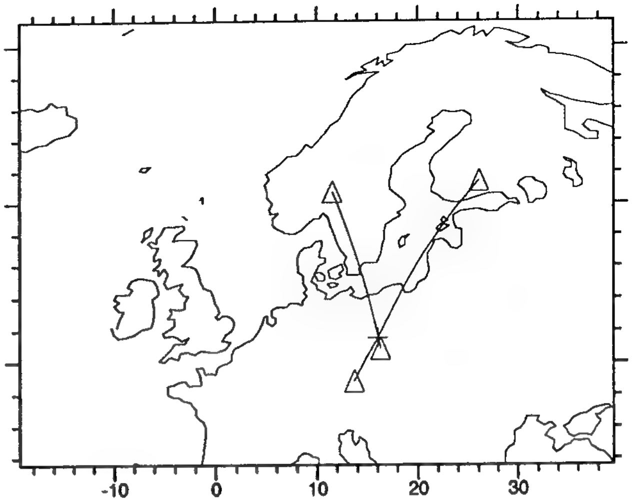
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	17:47:52.129	31	12.5	34.4	2	0.2	1273
Pg	Px	17:47:59.154	30	16.7	29.1	3	0.2	1274
Px	Px	17:48:5.725	20	15.4	8.6	3	0.3	1316
Sn	Sn	17:48:31.179	-1	-1.0	-1.0	-1	-1.0	1573
Lg	Sx	17:48:40.154	29	26.1	7.7	15	0.4	1275
Sx	Sx	17:48:46.075	47	28.1	5.2	5	0.4	1345
Sx	Sx	17:48:49.274	28	26.4	4.8	7	0.5	1276

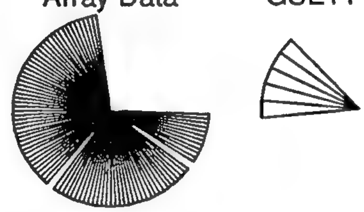
NRAO 9.538 162.67 346.44

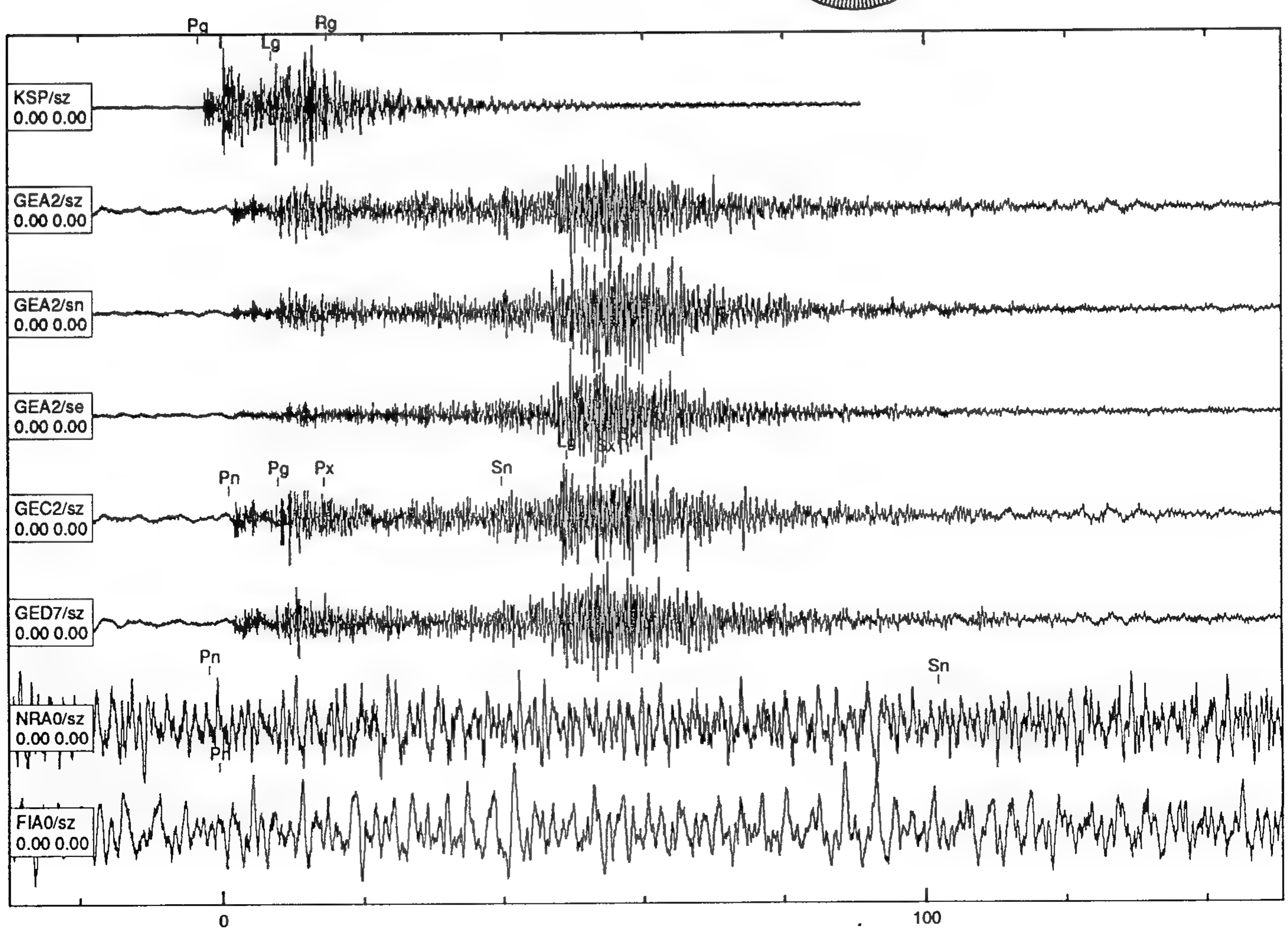
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	17:49:17.391	-1	-1.0	-1.0	-1	-1.0	1574
Sn	Sn	17:51:0.891	-1	-1.0	-1.0	-1	-1.0	1572

FIAO 11.329 213.50 25.14

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	17:49:42.996	220	11.3	6.6	1	0.3	1277







filtered as noted

Event Number	Dataset Name	Event Type
92	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 92

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991335	Dec 1,1991	3:32:35.366	51.4947	16.0762	0.8500	-	-	-	-	2.42	qmt	311	WIEJACZ

KSP 0.666 348.25 168.08

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	3:32:48.748	348	12.8	87.0	1238	0.2	1278
Lg	Lg	3:32:57.748	-1	-1.0	16.9	922	0.5	1279
Sx	Sx	3:33:2.463	57	17.7	5.6	616	0.2	1348
Rg	Rg	3:33:5.848	2	13.9	5.9	1975	1.1	1280

GEC2 3.060 29.02 210.84

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:33:25.904	-1	-1.0	-1.0	-1	-1.0	1576
Pg	Pn	3:33:32.279	25	14.9	34.6	3	0.3	1281
Px	Pg	3:33:34.375	27	15.6	19.6	2	0.3	1282
Lg	Lg	3:34:15.679	33	28.9	6.2	4	0.4	1283
Sx	Sx	3:34:21.098	24	23.7	3.3	6	0.7	1284

NRAO 9.600 162.76 346.53

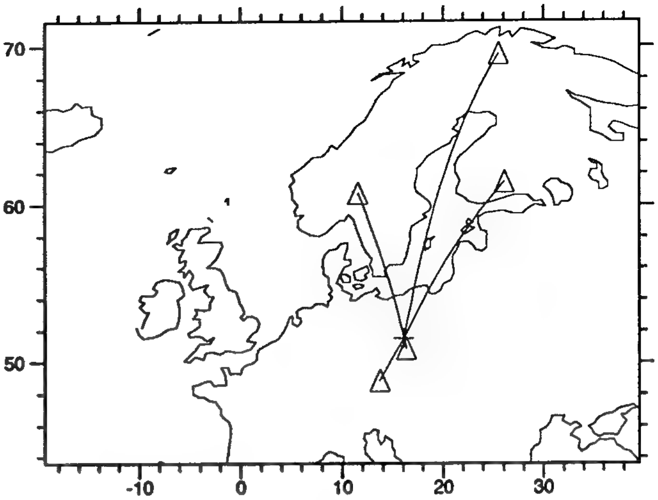
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:34:51.564	153	12.2	11.4	0	0.2	1285
Sn	Sn	3:36:35.684	-1	-1.0	-1.0	-1	-1.0	1575

FIAO 11.386 213.36 25.01

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	3:35:17.400	218	9.0	7.1	0	0.2	1286

ARAO 18.642 198.69 10.39

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	3:36:50.384	189	12.5	4.7	0	0.3	1287



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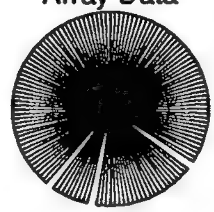

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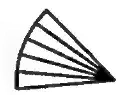
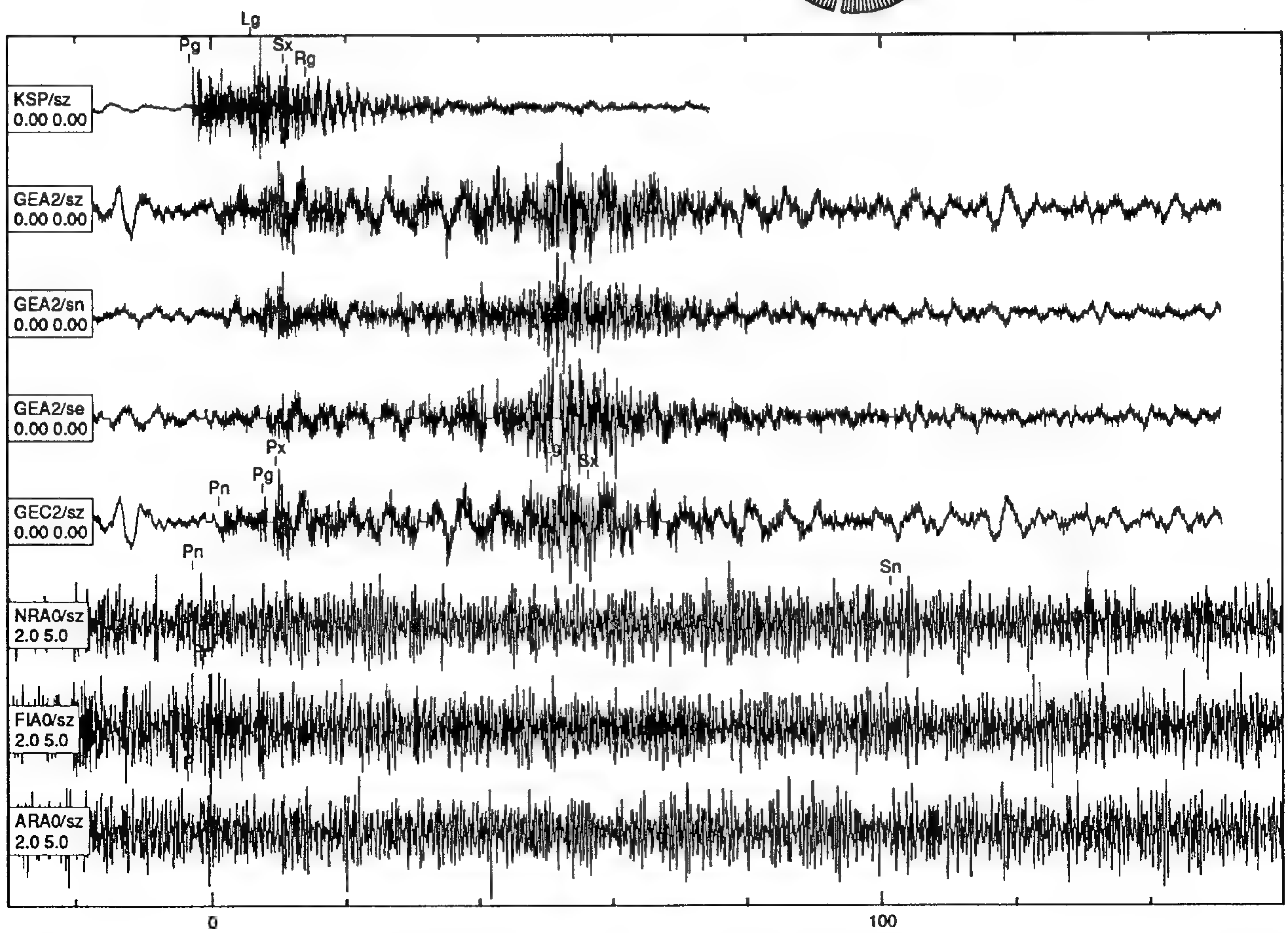




filtered as noted

Event Number	Dataset Name	Event Type
93	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
48	Polkowice (West); Field Descriptor G-31	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 93

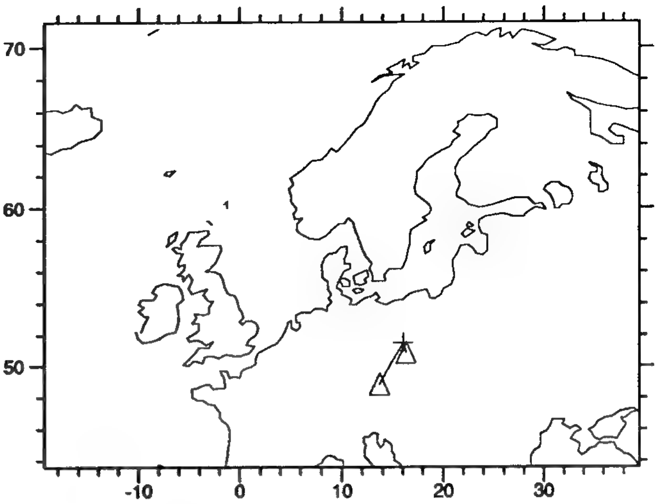
Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991350	Dec 16,1991	18:07:52.909	51.5120	16.0591	0.8300	-	-	-	-	3.08	qmt	279	WIEJACZ

KSP 0.686 347.67 167.49

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pg	Pg	18:08:7.762	346	12.0	58.2	2034	0.2	1288
Lg	Lg	18:08:17.362	-1	-1.0	11.2	1270	0.6	1289
Sx	Sx	18:08:21.812	-1	-1.0	7.5	1504	0.2	1290
Rg	Rg	18:08:25.062	352	5.7	4.5	2018	0.8	1291

GEC2 3.070 28.69 210.49

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	18:08:44.387	245	13.1	14.7	0	0.1	1351
Pg	Pn	18:08:51.312	28	15.5	23.8	3	0.3	1292
Px	Pg	18:08:57.600	30	15.8	7.8	1	0.3	1293
Sn	Sn	18:09:22.037	-1	-1.0	-1.0	-1	-1.0	1503
Lg	Sx	18:09:36.287	35	24.9	7.7	3	0.3	1294
Sx	Lg	18:09:41.074	37	24.6	6.2	7	0.5	1295



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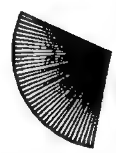

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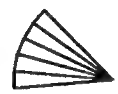
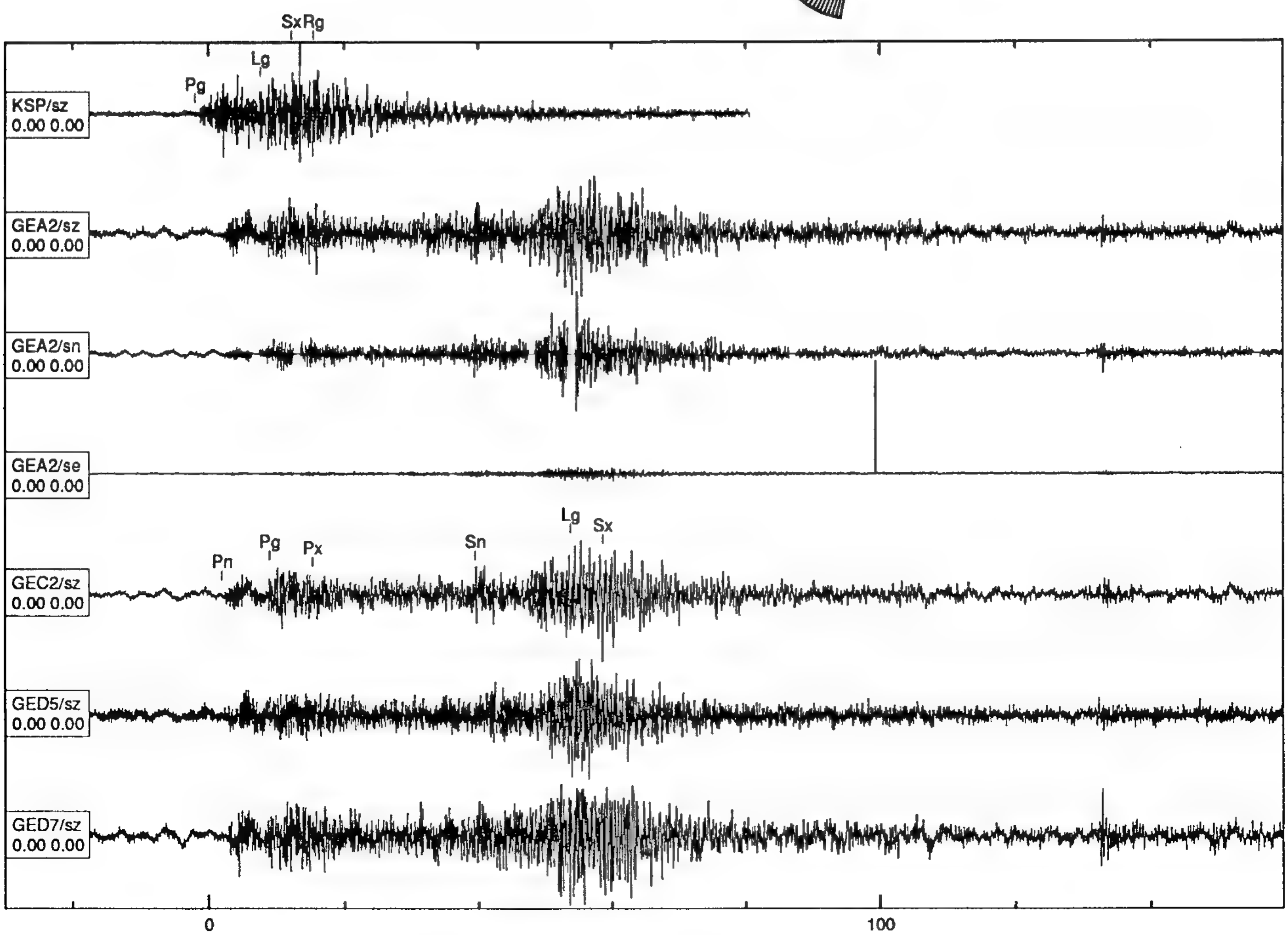




filtered as noted

Event Number	Dataset Name	Event Type
94	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Rudna	505

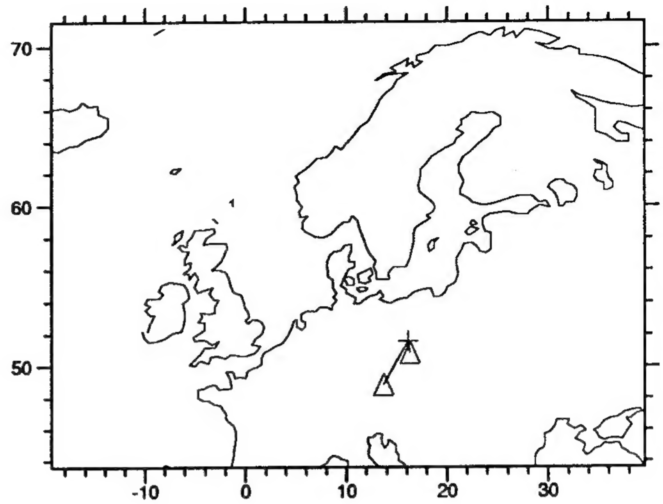
noteid	Notes	refid
53	Rudna (West); Field Descriptor G-11/6	505
58	horizontal location from mining seismic network-error 20 meters	505

Data Set 3, Event 94

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991351	Dec 17,1991	23:24:48.716	51.5602	16.1152	1.1500	-	-	-	-	2.99	qmt	312	WIEJACZ

GEC2 3.129 28.79 210.64

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	23:25:40.439	29	12.0	25.0	1	0.3	1296
Pg	Pg	23:25:47.689	34	16.9	11.6	1	0.2	1297
Px	Px	23:25:55.750	42	14.0	10.0	2	0.3	1298
Sn	Sn	23:26:18.539	-1	-1.0	-1.0	-1	-1.0	1577
Lg	Lg	23:26:29.876	13	25.1	6.5	2	0.4	1299
Sx	Sx	23:26:36.923	34	27.9	3.6	6	0.6	1317
Sx	Sx	23:26:38.998	16	20.3	4.2	9	0.6	1353



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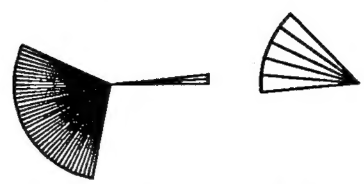
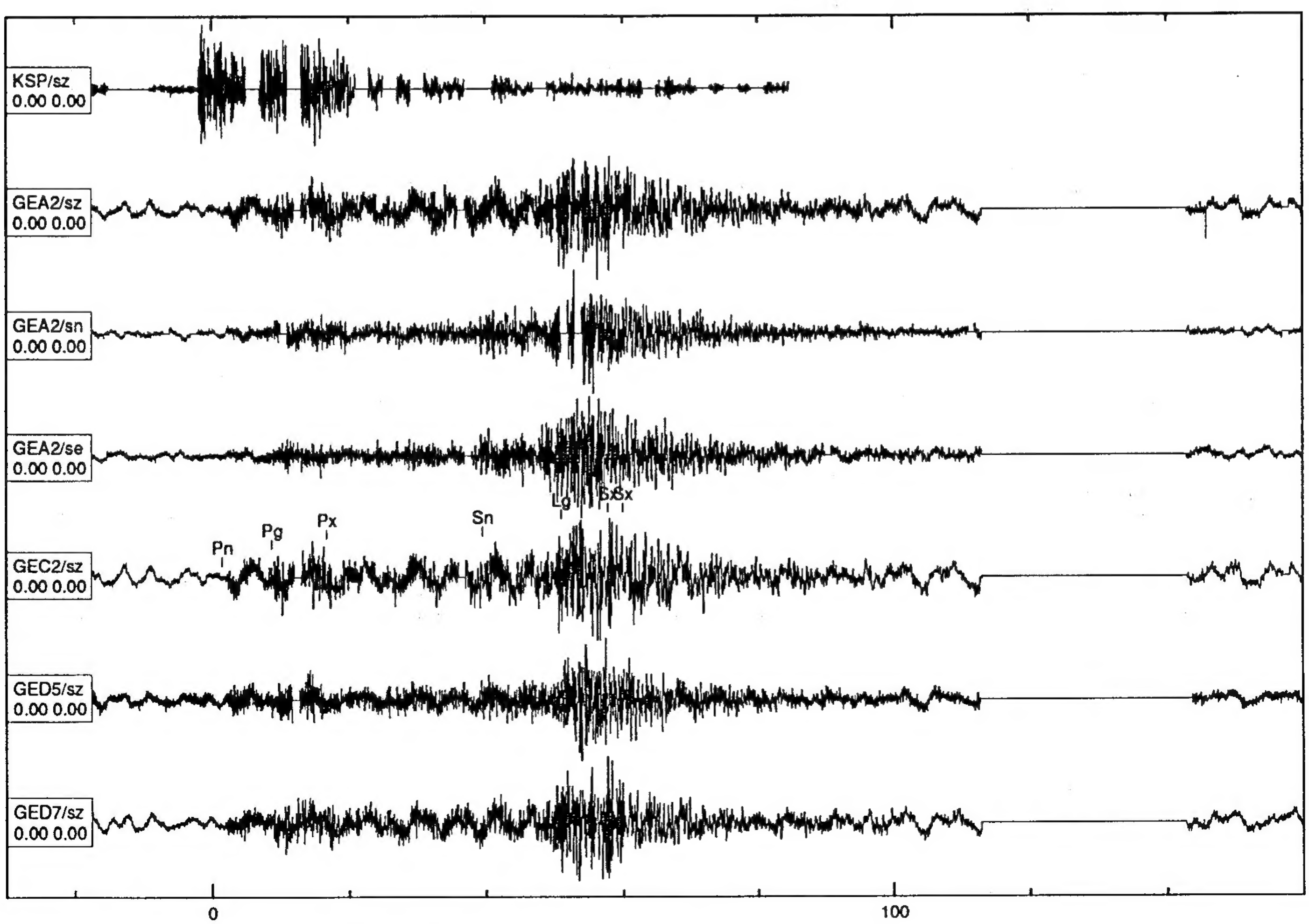




filtered as noted

Event Number	Dataset Name	Event Type
95	#3: LUBIN	qmt

attribute	Ground Truth	refid
etype	mining-induced tremor	505
lat,lon	from mining seismic network	505
depth	assumed at working level of mine	505
minam	Polkowice	505

noteid	Notes	refid
42	Polkowice (Center); Field Descriptor G-12	505
59	horizontal location based on geographic center of mining field- error 500 meters	505

Data Set 3, Event 95

Jdate	Date	Time	Lat	Lon	Depth	Smajor	Sminor	Strike	Mb	Ml	Etype	Orid	Auth
1991354	Dec 20,1991	6:32:56.578	51.4947	16.1211	0.8500	-	-	-	-	2.84	qmt	313	WIEJACZ

GEC2 3.075 29.47 211.32

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:33:46.799	-1	-1.0	-1.0	-1	-1.0	1578
Px	Pn	6:33:53.125	27	15.8	27.5	13	0.4	1304
Pg	Px	6:33:53.574	18	19.1	8.4	6	0.5	1305
Lg	Lg	6:34:35.924	31	27.7	6.2	9	0.4	1306
Sx	Sx	6:34:43.599	29	24.9	4.8	8	0.5	1319

NRA0 9.607 162.60 346.40

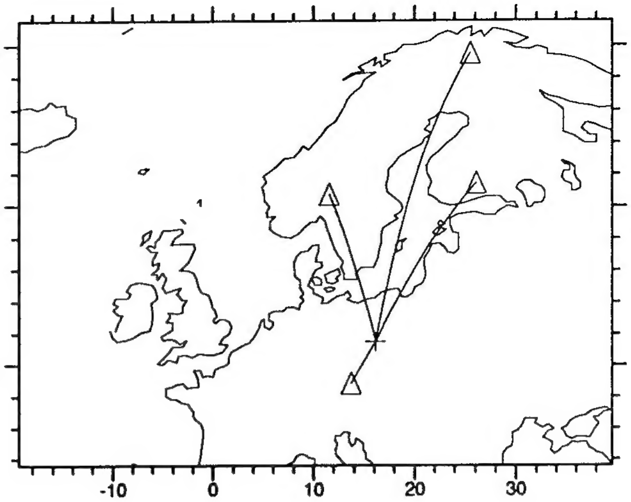
Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:35:12.840	152	11.9	8.1	1	0.2	1307

FIA0 11.374 213.23 24.91

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
Pn	Pn	6:35:38.725	222	10.8	10.8	1	0.2	1308

ARA0 18.637 198.60 10.34

Phase	IPhase	Time	Az	Slow	Snr	Amp	Freq	Arid
P	Pn	6:37:11.973	195	14.0	10.3	1	0.4	1309



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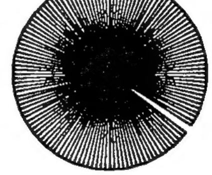

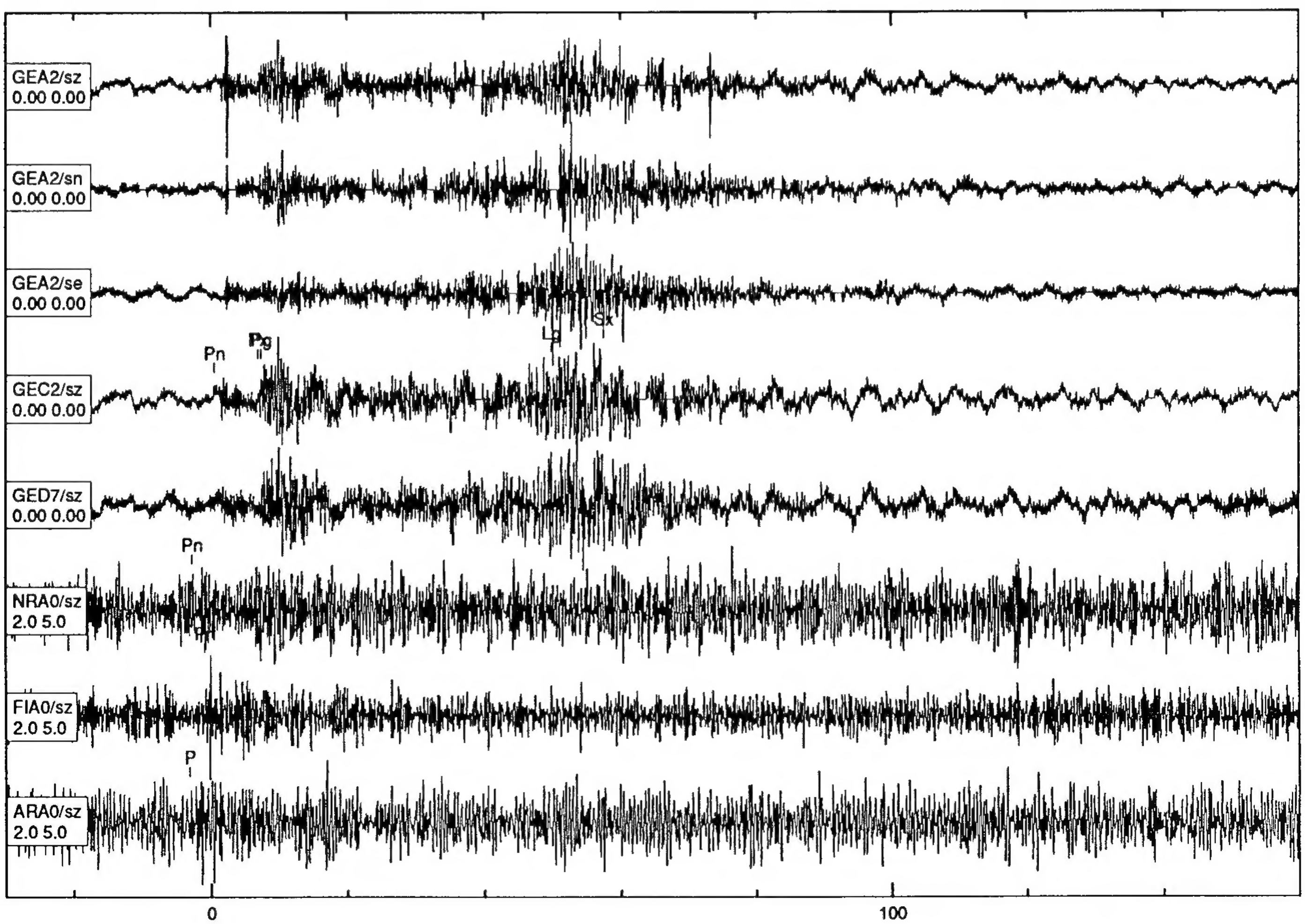

filtered as noted